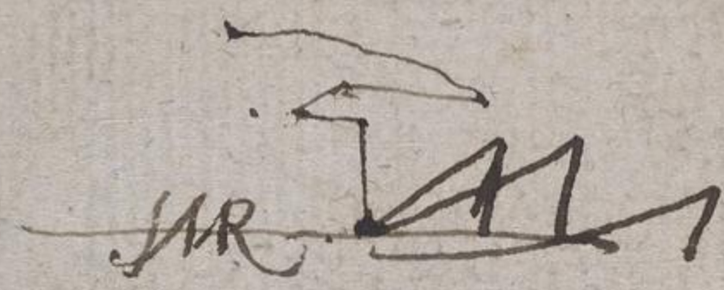
LJS BIBLIOTHECA SCHOENBERGENSIS
345
SCHOENBERG DATABASE OF MANUSCRIPTS LJS



To the Kyght honorabll and hys syngguller Good lorde Sir Wylliam Cecill
baron of burghleagh knight of the
most noblle Order of the Garter
lorde highe trevsurer of Inglond
m of the Cortes of Wardes and
lyveries Chanceler of ye Univer
sitie of Cambridge & one of ye Q
magiestes prive councell wyshe
bourne wysheth longlyfe wt In
Crece of honor In
parfyt hellthe &c

Kyght honorable whear as before
thys tyme I have byn so bolld as to shew
unto youer lordshyp som of my symplle
labores - as abought es - 3 - yeares past I
delivered youer lordshyp a bock contayn
ynge In ye first parte materes as toche
ynge ye shewtinge In Great Ordenance
& In ye second parte ye condentiones of
ye skalle for to know ye hieth & distance un
to any place assigned. wt ye Conclenshones
of ye Crosestafe &c. The third parte was as
tochyng Geometrie & how to doblle ye ton
adge or bordyn of a shyppe & ropes &c
and after yt youer honor was desiered

for to knowe A Way how for to mesur ye
proporcion of ye moolde of A Shype wher
upon I wrat A lytell notte as touchyng
ye arte called Statick Shewyng thear
howe to mesur ye proporcion of ye moolde
of any Shype ii or iii wayes wher by
ye youe may knowe ye fre Way Shype of
any Shype wt all yor ladyng & ye same I
sente unto youer honor. And mor fore
ther more I am so bold to trobble your
lordshyp wt thys rude thyng which I
do calle Inuencions or debices ye con
teute ther of ys Shewed un ye table
folowyng hopeyng ye youer lordshype
will vochsafe to tack yt in good parte
All thof ye yt be verie Symple & Rudly
handelled bothe in ye wrytyng & other
wyse All thof ye ye materes be very nes
sysary In dyvers Respectes & thys I do
feace to trobble youer honorable lordshyp
Any lenger at thys tyme boot God pros
per youer lordshyp in honor & vertue
in parfet helthe A men

By youer honores
bonbly at comaundy
ment wyllm bourne

Consyderynge wt my selfe gentell reader wth
howe Infynett paynes and labors dyvers hear
before men of most exelent wyttes and of passinge
knowledge have compiled theare bookes and wth
gratt head and circomspectnes the same examinede
and perused theare said travelles and wth great
feare and werynes the same publysshed ye same
and nott wthowght good cause / wher for theare
by they have opened them selves ther nam and
fame to no smaylle dayngeres and hasardes namly
to ye ver Judgmente and reporte of all men for which
cause now seynge I hav taken vppon me at this
tym a harde enterpryse a borden to heavi for me to
beare or sustayne who hath at lenght shewed my
selff so hardye for to publysshe thes hard and diffi
cult materes of dyverres new Inventiones or devic
the which som by of them I have gathered som by on
meanes and som by an other but ye most part of
them hath byne my owen Invention vppon sundry
causes in ye affaires yt I have had to doo / even as at
som tyme any parson may be driven unto an extre
mitey and ye thinge semeth unpossibell to be avoyded
yett by som smalle and slender devic ye danger therof
may be prevented wher as otherwyse ye perrell therof
most needes have hapened / and yett ye thinge yt hath

prevented ye cause hath byne thought to be of noe
oportunatte when yt it hath byn knowne and
before it hath byne knowne it hath semed most
unpossibell wherfor I han thought it good for to
drawe them to gether into this rude and barborouse
volom more for yt to han them in remembrance yff
yt ther doth hapon any cause to use them then the
fynnes of ye wrytinge or pennynge of them for ye wryter
therof is most unlernned and symple wherfore you
mooste not loke for fyne and eloquent and small termes and desiringe
you gentell reader to beare wth my rudenes consydering
yt it is ye good will yt I beare unto my natiue contery
for to proffett ye comon welthe as much as lyeth in me
which is ye ocation yt hath moved me to wrygth these
rude and symple Invention or devices althoff ther
is no dowghtes but that ther is a greatt nomber of most
excellente and pollityck and finer heddes yt I beinge
so rude and symple a parson to presume to be a medler
in these causes for yt ye first Inventiones or devices
is as consernynge matteres by sea and shipes both in
martiall affaires and other wyse ther unto apertay
nynge and allso ther is Inventiones or devices of ordinance
as well for servis as other wyse ther unto apertay
nyng and allso ther is Inventions or devices as
touching ye walles of cities townes or castelles as

apartaynynge unto marciall affayres and in
lyke maner ther is Inventions or devises as
touchinge materes in ye fealde as well mett
for generalles as captaynes or leaders of men
and also ther is Inventiones or devises as touching
geometri parspectiue to know the hyth and
the dystance unto any marke assigned and to
doe it dyvers wayes wt other necessary inven
tiones or devices as in ye tabell folowynge it
doth appear the whych inventiones or devices
ar very necessary for to be had in memory alltho
yt it is possible yt those yt those men yt hath byn
trayned of longe tym in marciall affayres
parhapes may or doth know a greatt nomber
of better devises then theses yett notwythstondyng
I have written thes and allthoh for ther symppell
nes they will do them no good yett I am assured
yt they will or can do them no hurt allthoffe
that they be but of a symppelles parsons Inven
tynge / for all artes sientes or facullties they
hade a begynnynge before they cam unto ther
perfection / and yett it is possible ther hath
byn dyvers Inventions that hath com unto
no perfection or purpose and yett nott wt
stondynge they ar rather better to be commended

then those parsones that hath greatt revenneys or
levinges of ther owne ytyre and som hath greatt
levinges out the Churche and yett they doe
practice no other thinge but howe to lyve
easilye to satisffie his carnall lust and ple
sur and som of them yf they do practic anye
thinge that shall be but myscheff in ye comone
welth &c for they do nott consider ryghtly wher
fore ye man is borne upon ye face of ye earth
as first he is borne to serve God for yt he hath
created hym and all mans kynde and hath
and hath created hym a resonable creature &
and hath created all thinges for his use as first
the earth wt all his mineralles as we do dygoutt
of ye earth golde syllver and all other mettalles
and stones to make us myssisans to serve
manes use and allso the face of the earth he
hath created to bringe forth trees to make us
tymber and grasse to fede cattell to make us
foode and meatt corne to make us bread wt
all his other comfites which man retayneth
from ye face of the earth / the sea wt all other
ryvers bryngeth forth fyshe of innumerable
sortes to make use foode and meatt yea ye very

sea as for mans use to passe from contery unto con
terye the arte in lyke manner wher in there is mul
tytuddes off fethered fowles for mans use yee the
very hevens ys for mans use as the sonne the moone
and starres ar created for the use off man and also
he hath redemed us from the orygynall synne off adam
by his precious blud shedynge wherfore we are
fyrst borne to serve god and secondly we are borne
to serve ower prynce and native contery that is to
say to defende ower terrytories that no other forrayne
nations doth spoyll us off our labors or our
prynce off her dygnitye and thyrdly we are
bounde to provide for ower hoshold and ower fa
milye and see that they ar trayned up to lyve in
the feare off god and to know ther dewtie to the
magystrattes and to trayne them up unto som
facultye wherby they may gett them a lyvinge
the wherfore I woold wyshe all thoss parsons
that hath any offyce or lyvinge off the Q majestie
nott to be Idell and to desyre to lyve easyly but
to practise some thinge accordinge unto such
talent or gyfte that god doth gyve unto them
wherby the comon welth may be the better mayne

maynetayned the prince better served and our contry
the better furnysshed wth suche parsons yt are able
to defende ye prince crowne and dygnitye as well
in ther good counsell as in ther actes and deades
and for by practisynge they may attayne unto
knowledge in any affayres / yett it is possible yt
some will say yt in marciall Affayres ye practice
is to no purpose yf yt he hath nott seen ye warre
in ye fylde / and allso it may be said agayne that
ther is a nomber yt hath seen warre in ye feelde
and yett hath no Judgment at all in ye affayres
for yt we may see by comon experience yt som persons
hath byn trayned uppe all ther dayes of ther lyffe
to goe unto ye sea 20 30 and 40 yeares and yett hath
no knowledge to be men to take charge for that
they ~~p~~ will practice nothinge and other some
parsones by practice ys abell to take charge in ye
space of 3 or 4 yeares and is as soffisient men to
~~take~~ take charge as them yt hath byn in ye space
of 20 yeares &c wherfore we may see yt practice
doth much prevayll for by practice he yt hath seen
but a lyttell experience of warre by consideration

off that reason that he hath seene may practise further
for it is nott possyble yf a man hade seen warrs
a hundrethe yeares yett at a tym in servinge the
fylde ther may happen suche a matter that in all the
tym the like hath nott byn seene nor happened ther
fore in the readinge off suche authors as hath written
I am afrayde all thoughe that he hath nott had no
great experiens in the matter yett practise shall
mutche avaylle hym so that you may conclude that he that hath
seene mutch and hath never practise nothinge
can have no Judgment in any matter then
you must needes confesse that he that hath seene lytell
and doth practise may have som Judgment etc.
but then it must needes be sayde that he that hath
seene experience and doth practise must needes
be som connynge accordinge unto the sharpnes
off his witt and the valiantnes off his corage
and furthermore yf some sholde aske this question
and as it is many tymes sayde yf that suche a noble
man be in the fylde that it is nothinge agaynst
hym but yf that he doth com into the fielde he shall
have the victory and the question is how that it will
com so to passe / then whatt sholde be the cause
therof now it is possible som will alledge one

of longe tyme he doth knowe howe for to provide and
sett forth an army and contraryewyse he yt hath served
but as an Inferior captayne hath no other care but
to trayne his men ye generall and his counsell doth
knowe the where for to lodge and provide for ye armye &
all other necessary matters and hath ther spialles a
brode and doth knowe whatt manner of men is mete
best for all manner of purpose and in lyke manner
doth knowe whatt manner of grounde is best to in
counter wth his enymyes and allso knowinge howe
his enymyes is prepared so accordinge he doth order and
prepare his battell to prepare for every mischeff yt
may happen for yt he hath seen and hard so ofttym
tymes ye experyence of those matters wheras those
yt hath served as an Inferior captayne or soldier hath
never had any occation to consider of those matters
but onelly to trayne ther soldiers and to make them
handsom how to kepe ther order of ~~Inbattelling of them~~
~~selves~~ and to handell ther weapon but for any order
of Inbattlynge of them selves yf yt they cam forte fight
in the field at was allwayes at the discretion of the
generall and his counsell and furthermore admitt yt
in the fyghtinge of a field yt they ar over thrown or hath
geven the overthrow ye generall of ye army and his
counsell hath parfitt intelligence by whatt meanes

yt it hath happened and what thinge stode wth them
and what thinge stode agaynst them yt is to say yff
them yt wer overthrown had forsene such a cause then
they had nott byne overthrowne and allso them yt did
gyve ye overthro yff yt they had nott don such a thinge
they hade nott prevayled so yt ye generall and his
consell doth perfittly understond of ye matter whatt
was wth them and what was agaynst them for
for yt they doe heare what hath happned in every
place in ye armye yff yt it be written of knowinge
wher as he yt doth serve but as an inferiore
captayne doth heare nor see no other matter butt
those matteres yt hath happned in his owen bande or
neare unto hym and ye generall and his consell hath
athorrity to send for and to examen every parsone
yt can say any thinge in any matter whatsoever yt
it be &c and further more ther is a greater matter
then this wherby yt those yt ar ye generalles or in
consell neare a bought ye generall yff yt they be geven
unto pratic and han good wytt wherby yt they may
haue a greatt deell further instructiones and knowledge
in those affaires then any other comon captayne or
souldier whether is this / for what is he yt is a souldier
or any other parson but yff yt he h doth know any
further matter or secrett then any other parson doth

know but y^t he will make meanes to shew it unto
y^e generall wher by y^t he may have y^e better reward
or entertaynment so y^t you may conclude y^t yff 40 or
50 thowsande men were in y^e felde y^t yff ther be any parsones
y^t hath any knolege or connynge but y^t it wilbe vtered
and shewed unto y^e generall then yff y^t y^e generall be
valient liberall and wyse as it is a place for a wyse
man ther is no dowghtes but y^t yff he be geven to
practice these matters he must nedes of force be
com most excelent for y^t an infinite nomber of other
mens practices is putt into there heades so y^t of force
they moost nedes excede all other men in marciall
affaires wher as he y^t is but an inferior capitaine
all though y^t he be geven unto practic can never atayn
to y^t which y^t y^e other hath for y^t he hath not y^e like
instructions in these affaires nott to be a generall
except great fortune be and thus gentell reader I do
ceace to trobell you any longer desiringe you to beare
with my rudenes y^t I shold take upon me to publishe
any new inventions and especially in these affaires
considerynge what a nomber of wyse and valiente
gentellmen and soldiers and other lernid parsons
y^t ther is in england and ther is no dowghtes but
that they do know a nomber of better then these but
yett I am well assewred all though y^t they will do them
no good yett they will do them no hurt and it is possible

to the reader

y^t upon the redinge of theis rude inventiones they
they may finde in some of them y^t thinge y^t may ple
sure them and they them selves may further gather
of them for at the first inventinge of any arte or
siens yett them y^t came after them brought it unto
perfection so y^t upon the rude and bare inventions
y^t there may be som further mater gathered of them
and may com unto parfection allthough y^t som of them
doth com unto littell purpose

~~[illegible]~~

The tablle

The table off the contents off ye devices
and fyrst off matters by sea and shippes

The fyrst devise is howe for to knowe whether 1
yt any shippe ye see a borde then ye shippe yt
you ar in and allso whether ye shippe dothe over
sayle you or understayle you and to knowe
yt justly a myle before yt you do com at
her &c

the 2 devise shewethe howe for to arme a shippe 2
to fyght with ther enymyes

the 3 devise shewethe how to make a playne or 3
open deck with hatches yt it is nott possybell
to enter ye shippe withowght spoyllynge off ther
enymyes

The 4 devise is whatt to obzarve in ye bordynge 4
off any shippe a borde &c

The 5 devise is ~~whatt~~ howe for to clere youre 5
selffe from hym yt hathe layed you a bord yff yt
you do see yt he is to stronge for you

The 6 devise shewethe you howe to prevente 6
a man off warre yt he shall nott be abell to

lay you a boorde nott to enter his men wth ease
but yt 10 men shalbe able to kepe owght 100

7 The 7 devise sheweth you how for to synke a
shipp yt hath layed you a boorde wthowghte ye
shootinge of ordenance &c

8 The 8 devise sheweth you how for to dyscom-
forte a whole navie of shippes yt doth ryde in
any place for ye defence therof allthoughe yt you be
nott ye 14 part of ther strenghte &c

9 The 9 devise sheweth you how for to dyscomforte
an army of shippes by sea whereas ther principall
force doth stand by one or two shippes &c

10 The 10 devise sheweth howe for to encounter wth
an army of shippes of warr by sea &c

11 The 11 devise sheweth how for to make provi-
sion yt another shippe shall nott come a boorde
of her to be putt in ieoperdy of fireworkinge &c

12 The 12 devise sheweth how for to pass by a castell
that doth stand by ye mouthe of any haven or
harborowe yt ther must com in warr yt they can
nott pass [illegible] to be putt in ieoperdy of shootinge &c

The 13 devision sheweth you how to prevent them | 13
that meaneth to bord your men over boorde when
that you have entered your men and allso by that
meanes you may com to mast his men and
to make the other shipe the easier to be enterede

The 14 devision sheweth you how for to use a shipe that | 14
she shall nott sinck but shall swymme and beare sayll

The 15 devision sheweth you how for to make such | 15
provision in a shipe for to save your men from
beinge spoyled with the greatt ordenance &c

The 16 devision sheweth you how for to theyme a | 16
haven or ryver allthoff that it be a mylle broode
or over in such sortes that no shipes shall passe
by nyght nor by day &c

The 17 devision sheweth how for to make provision | 17
to bringe a shipe in over a barre and to make her
beare sayll havinge no ballest in her and allso
how for to lyfft the shipe or her owght of the
watter yff it happeneth so that ther is nott watter
inoff over the barr when the ballest is all owght

The 18 devision sheweth how for to know the | 18
trewe waight of any shipe that swymmeth in the watter

The 19 devision sheweth how that you shall know | 19
the waight of any thinge sonck in the watter to

The table

75 The 75 devise shewethe how yt you shalle knowe ye myndes of your frendes in ye myght whatt yt he wolde do or whatt yt you shulde do for hym &c

The devise of martiall affayres by land

76 the 76 devise dothe shew unto you how manye men will stand on any space of ground they beinge in theyr battell or marchinge from wherby yt you may vewe whatt number of men there may be of them &c

77 The 77 devise shewethe how for to kno how many hundredes of men will be in a myle off lengthe heer by yt you may by ye vewe off there marchinge knowe the number of men

78 the 78 devise shewethe the squarerout or number of battell

79 The 79 devise shewethe how to enbattell your selfe forward upon ye ground yt is to saye yt ye ground shalbe as many foott ye one way as it is ye other way and allso there is tables mayde for yt xeiu rowes &c

80 The 80 devise shewethe unto you yf yt you have any charge or battell geven unto ye syde or flanke off ye battell then upon ye sudden ye syde of ye battell shalbe as stronge as ye frounte &c

81 The 81 devise shewethe you a way for to knowe

how many men will be in a ranck & how many
ranckes yff there shall be off them for any nomber
off men assigned to be sett vpon ye ground at what
season so ever yt you would have betwene them
both in lenght and bredth and allso for to knowe
how many foote off ground square they will stand
vpon or occupye &c

The 82 devise sheweth you a way for to knowe 82
that when yt you have sorted your weapons &
knowing ye nomber off weapones off every sorte
and you would be so many men in a rancke yt
doth shew vnto you how many ranckes yt
there will be off them off every sort off weapones &c

The 83 devise sheweth that yff yt you are 83
in battell and would take an other peace off grounde
which yt you can nott do except yt you must pass
thorow a straight this devise doth shew vnto you
how yt you may passe thorow and never alter ye
forme off your battell &c

The 84 devise sheweth vnto you how yt you may 84
shifft your sellff from one nomber off men in a
ranck vnto an other nomber off men in a ranck
and to doe it with ease & speedelly &c

The 85 devise sheweth vnto you yff yt at any 85
so yt in ye forefront yff yt ye ranckes off men

ye tablle

there shalbe off ye distance be any thinge far off by ye degrees off a quadrant or astrolobe &c

The 107 devision sheweth how yt you shall know ye dystance unto any shipp saylinge upon ye sea you beynge upon any hight cliff by ye sea cost and you shall know it in som cases by ye degrees and in other some cases by ye scall &c 107

The 108 devision shewethe how yt you shall know ye dystance unto any ship on ye sea you beynge in a shippe in lyke manner and bothe the shippes saylinge and nott standynge still both by ye degrees and allso by ye partes off ye scall &c 108

The 109 devision sheweth a way to know the dystance unto any shipp saylinge on ye sea you beyng in a shipp allso mor exactly then before wherfor shal by ye cross staff &c 109

The 110 devision sheweth how for to know the hyth off a wall or tower wth a dyche off water &c 110

The 111 devision sheweth how for to kno ye hyth off a tower or wall an other way wth ye dyche off water 111

The 112 devision sheweth unto you that you haw any occation to lyft or way any thinge up from ye ground and to do yt after collyrecyf wyse and you knowinge ye wayght off ye thing that is to be lyfted 112

howe many degrees ye sonne is hye by ye length
off ye shadow off ye staffe &c

126 The 126 doeth sheweth howe for to knowe
the howers of the day yt is to say what yt it is
a clocke by ye length off ye shadow off ye sonne wth
a staff &c

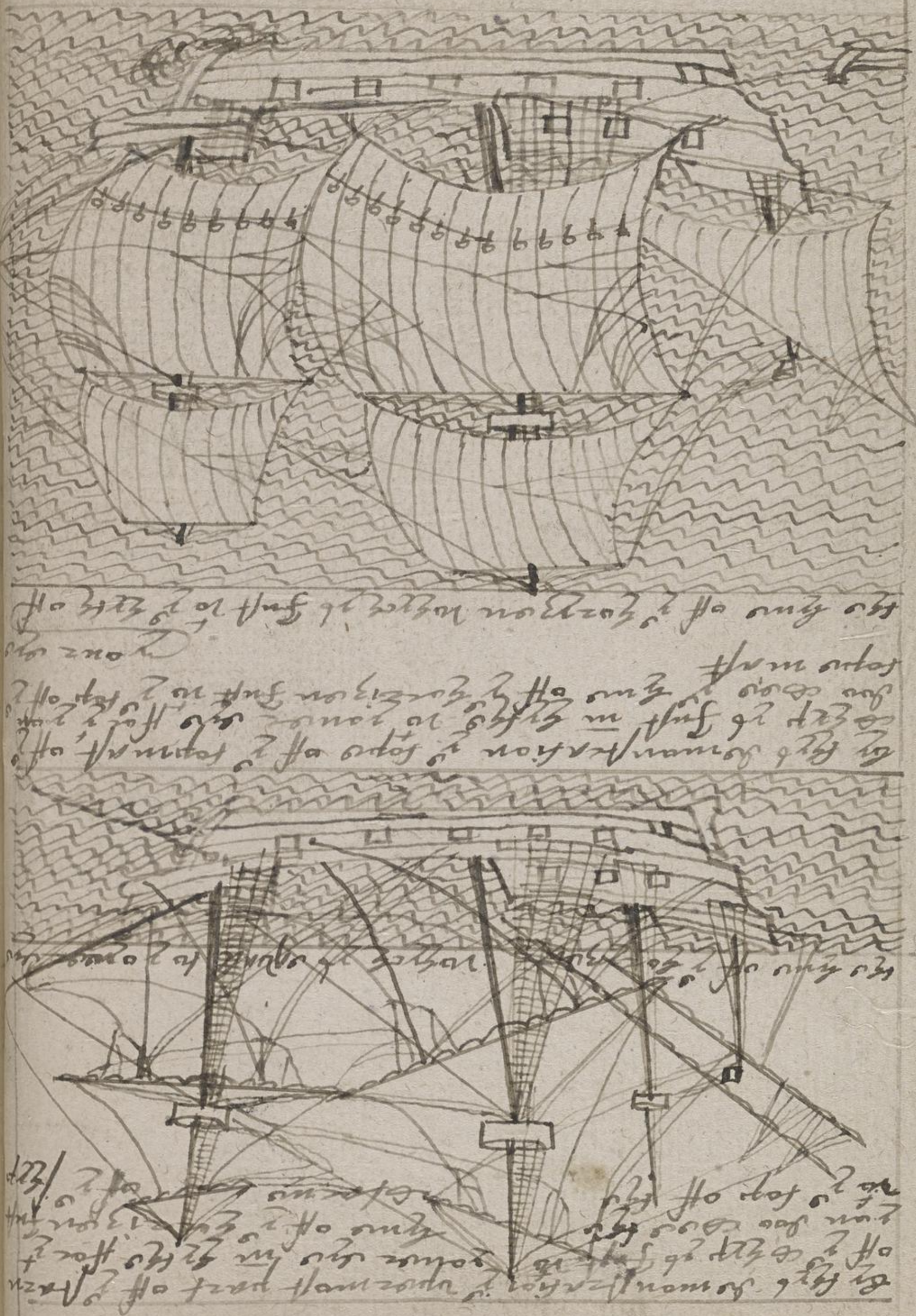
127 The 127 doeth sheweth howe yt you may send
letters secretly unto your frendes and receyve
letters from them when yt you are besieged in a towne
or fort and no parson to passe owght no in &c

128 The 128 doeth sheweth howe for to make from
leade or ston or any kind off metall to swym wth
owght ye ayde off any thinge to holde it or
cause it swym &c

129 The 129 doeth sheweth howe it may be possyble to
burne any thinge yt is apte to take fier as gonne
powder ocom or flex or pitche and such other lyke
halfe a myle or a myle from you and to do it
by glasses &c

130 The 130 doeth sheweth howe it is possible to
see a smayll thinge a great dystance off as to reade
a letter a quarter off a myle from you or to see
a man 4 or 5 myles off or to vewe a towne or
castell 6 or 7 myles off and to see the wyndowes
and towers therof

•



ame

The firste demaunde hipsometrie

ffirste there for to knowe whether that any
shippe be hyer or lower of boorde then the shipe
that you are in or also whether that you doe
over toppe her or undertoppe her/ yt is verie
necessarie for him that is a captaine of a shipe
for to knowe for by that meanes ther may growe
great advantage by the knowinge of it and in
many great inconveniens by not knowinge of
it for when yt he dothe knowe before that he
dothe laye a shipe a boorde where for to enter
his men to the most advantage and easte yt
is a greate helpe there to doe moste the good and
this waye youe shall knowe it most certenlye
stande you upon the poupe of your owne shipp
and looke you uppon the othere shipe and yf that
you doe see the horizon cutte over ye poupe of ye
other shipp then the shipp that you are in is
hier of boorde then the other shipp but yf that

you doe see any p(ar)te of the other shipp hier then the
lyne of the horizon then that p(ar)te of the other shipp
is hyer of boorde then your shipp by so muche
as you doe see above the lyne of the horizon for
this is generall for ever looke what soever yt you doe
see even wth the horizon is iuste in heighte
equall wth your eye nether hyer nor lower so by
this meanes you maye knowe what heighte
yt any shipp is in everye place comparinge her
by your one shipp as this yf your shipp be
hier then the other shipp then doe you lower
in your owne shippe till suche tyme that x
you doe see that p(ar)te of the shippe even
wth the horizon and then looke uppon
your owne shippe and marke where that
the horizon cutteth / then that p(ar)te of your
shipe is iust equall in heighte of the other
shipp and by this meanes you may p(ro)ve any
shipp in eu(er)y place at your pleasure and then
to knowe whether that the other shippe

bothe on toppe you or under toppe you then either
goe uppe you selff or sende uppe upon the shrowdes (unto ye toppe)
and then where yt you doe see the toppe
of the other shippe iust wth the horizonthen
youre eye is in sight iust wth the other shipps
topp whether that you be under or on the
topp of your owne shippe and this is trewe
wthoute anye faile

The Seconde devise

As touchinge this howe for to arme a shipp of
warre to fighte wth ane other shipp or shipps
this moste be considered yt you doe kepe your
men as close as may be for beinge spoyled
wth smalle shott or quarrells and arrowes
wherfore you moste have a bonet of a sayle
or elles some other canvase stretched and
made fast all a longest ye waste and deckes
of the shippe and allso to aboute ye forecastle
and ye poope wth mantelles or gownes and
suche other lyke godes to shaddow your y

ment and then in lyke maner your topes to be
armed to shadowe your men but now in thes days
the tope fyght is but unto lytell purpose
seing the use of calyvers or mosketes in shypps
for a man may arme the tope for ye quarrelles or
arrowes but it is nott possible to arme it agaynst
the calyvers wherfor yt ys nott good to have men
in ye topes
in thes days for they wilbe but spoyled and
allso you most catharpe your shroudes and allso to
have a nettyng to goe wth chaynes in your wast and
in lyke maner abafte your mayne shroudes a
cordynge unto the billdynge and ye contrivinge
of the shyp and then you must apoint your
smale shott to stand at the loppes and such lyke
places to beatt at your enymies and in lyke
maner ye gonners to use the grett ordynance
and so forth consequently every parson to
loke unto his charge that the capitane
hath apoynted them to doe

The thyrde devyce

And forther more you may make a playne deck or orlope
yt hath but playne hatches and hath no other fyght
that yt shalbe in maner unpossyble to wynne the shipp
as throwght the shuttinge or spoyllinge of the ship as
this take uppe two of the hatches one before and an
other a baffte as you shall se it most convenyente
for your purpose and at the corner of ye hatch make
a holle wth an awger so that ye 4 corners of
ye hatch yt ther 4 holes and ryght a gaynst the
every skoppelle when ye hatche ys layd bore
yt wth the awger downe throwe the tymbers
and the beame and all at the 4 corners &
then take a pec of wode of 7 or 8 inches -
longe and a 3 or 4 inches thick whether it be
round or square it is all one matter and then
bore a holl wth the awger throwe the lyttell pec
of wod throwe the myddell of at ye ende unto ye
outher ende and so to have for every corner of

the hach one and y^t marketh 4 for everye of
hach and then prepare for every corner of
of the hach a bolte of Iron w^th a good brode
hed and to be of lenghte to goe thorow y^e
hach y^e thicknes of wood and longe and y^e
Cummynge of the hach and y^e beame and all
y^t yt may be sure locked under nethe and this
to serve two of y^e hatches and then when y^t you
doe see cause you beynge a marchant man y^t
any shippe of warre doth assayle you then sett
uppe y^e two hatches in y^e shippe and locke y^t y^or
boltes ~~and locke~~ be sure locked undernethe
y^e decke and then the hatches wilbe 7 or 8
inches hier then y^e rest so by y^t meanes ther
can no man com uppon the decke but they may
either launch a pike at hym or shoott a
caliver or use a cros bowe or drawe a
longe bowe and so generally ther is no weapons

but yt they may rest at them rounde a boute ye hatche
that it is nott possyble to be vnspoyled vppon the deck
and beynge the hatches shutt this ys one hatch shall
Cleare yt owther and this devise is 100 tymes better
then ye Spardecks

The 4 devise

As touchinge the layinge of any shipp a borde
yf that your shipp be hyer a borde then the other then
enter her where that the best place is for to enter
her that is to say where that she hath lest force
agaynst you to defende them selves and where the
your men may entre wth most ease and yf that
the other shippe be hyer of boord then your shipp
then you must lay her a bord that you may com vnto
the chayne walles to entre by the shrowdes ether
the fore shrowdes or the mayne shrowdes / & and
furthermore this must be most princypally

obserued yff that you han any consorte or consortes
off any other shipp or shippes that dothe come to
helpe you or you come to helpe them that you
doe nott laye them a boarde the one vpon the one
side and the other vpon the other side for then
the one off you shall doe the other off you more hurt
10 tymes more then the enymye bothe wth your great
ordynance and alsso wth your smalle shott and your
owne quarrells and arrowes / wherfore yff yt the
other shipp be aborde all redye a longest the
syde then yff that you can nott han rowm to laye
hym a boarde off that syde then laye hym aboarde
thwart the stem or thwarte the sterne as you
shall see to your most advantage but in any wyse
come nott a boarde one the other syde for then you
shall spoyle your selff and your consort in lyke maner

The 5 dewe

yff so be that any shippe hathe layd you a boarde
and that you are to weake for hym then yff so be

that you doe se the wynde and the tyde to be
all as one or yf yt it be calme then uppon a
sodain [illegible] downe an Ancker and then
as soone as ever your shipp doothe ryde then
the tyde will carry the other shippe
away from you and then yf that the wynde
and the tyde be all one then yt is nott possible
for the other shipp to come neare you agayne
nott untill y^t the tyde doth turne to come unto
the wyndwarde agayne

The 6 order

And yf that any shipp doth give you chase
and th^t you doe knowe y^t you are to weake for hym
and also althowght that he sayleth better then
your shipp then when that he doothe come
neare unto you and there is no remedye but y^t
he must nedes laye you aboarde then get you
have afore the wynde betwene your 2 sheates
and then as the other shipp doth fetche uppon
you and be readye to laye you aborde always

kepe your starne vnto hym and suffer hym nott
to com uppe by your syde so shall you dryve
them to enter at your starne over you poope
and then they shall enter so paynefully for
they must clamber uppe by ther owne shipp
bowle spreett at shuch a narrowe place as the
starne is that a fewe men shalbe able for
to keepe them oute and this you may doe with
ease as longe as you have rome to goe afore
the wynd that he shall never be able to lay
you a borde but onelye at your starne so that
the steeridge be well looked vnto for as sone
as you doe see hym prease to com uppe by your syde
then loose your from hym and so by that meanes
he shall nott be able to com neare no other place
but your starne

The 7 dryve

yff any shipp hath layde you a borde a bowte
* your bowes and yff that you would shifte him
then lett your ancker next vnto hym hange

A rocke bed wth a stronge paynter or rope
that the crosse or flukes may hange a lytell
under the watter and then by the meanes of
the heavinge and the settinge of bothe the
shipes wth the sea the ankers will wrest
or plucke owte the planc of the shippsyde
wth the anker flukes and yett yt will nott
doe your owne shipe no great hurt for that
still the anker hangeth lowell but at one
lenghte and the most hurt that yt may doe
unto your one shipe yt will pierce but a
hole but for the other shipe she fallyth
downe uppon yt wth her hole weyght at a suddam
lunge together wth the must needes wth 2 or 3
plunges rent owte the plancke of the shipe
syde

The 8 devise

Yf that an armye of shipes doth ayde in
any haven or ayde to defende any plac or
to kepe any plac for the wardinge of more
strength or to kepe any plac from vitayls
and that they mean to ryde there still and han *

placed them selves in suche order that no
shipp may passe by them then to doe
theire exployte to passe by them other to
wynn a place or vittayll that place then yt
maye be doone first take these spare shipe
a sufficiente nomber of bark or old shipp
as shallbe conveniente and then put suche
kynde of stuffe into them as will quickly
be fired and then when that you doe see
conveniment tym that the wynd and tyde doth
serve your turne then send those old shipp
before wt a fewe men to conne them under
sayle and wt boottes to save them selves and
then lett them a littell before sett them afire
and laye the principall shipes a boarde
crosse theire halses and then there is no doubt
but that they shall drive them to lett slyp
there Ankers or consume them wt fire and
then the more meny that there is in number
a borde the greater shallbe theire terror yf
that they have nott boate ynowe to save

them selves and then presentlye as for that
you may com in and doo your exployttes for
yt they wilbe in such a maze with the fyer
that you may doe what you lyst for yf that
this devise had bene put in practis by
countye mongomerye when that he went to
Rochell there is no doute but that they had
bene dyscomforted or spoyled all those shipps
that did ryde before Rochell and all so
ye countye mongomerye myght have landed
at his plesure

practised in 88 agt ye Spanishe Armado

The 9 devise

when there is any fleett that dothe passe
thorowe the sea that dothe carry ether some
principall person of estate or ells some
quantitie of treasure or other ryches and have
certen shipps of great force to wasst them
then to doe their exployttes to com by the spoyle
of them yt may be thus handeled yf that
yt be nott disclosed the secretnes of the
matters as this yett some great shipe or shipps
of countenaunce that are but bad and

sett them seme to be the admyrall and to
encounter wth there admyrall or prinscipall
shippes off force and then when that they be
aborde to sett them ~~the~~ one fire havinge such
thinge a board that will burne wth grett
terror as this will sett a great catherne
off pitch or tarre uppon the fire and
make a grett fire under yt and then
lett all ye tackle above the heade be
newlye tarred and allso han such
thinges neare as will take fier presently
and then whenfirst that you are aborde of
them then sett fire off yt and yt wilbe
at the tope on a sodane and so shall you
consume bothe the shippes wth fire &
the men in your shipp are allwayes
prepared to save them selves wth the
boates then the other shippes may followe
the spoyle or chase at there pleasure and
then when ye they doo see there chefest

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forse taken from them then they wilbe disco
raged presentlye

The 10 devise

The principallest matter for to encounter
with an armye of shippes by sea is for to
have the wethergage of them for dist
ances and for y^t those distances is nott un
knowne unto most men I doe cease for
the sayenge any thinge therin and in like
manner never goe a borde 2 shipps maranet
for yf you boord the one shall annoye the
other of them and the rather that you doe
enforce your enymyes the more advantage
you shall have of them for that one shall
hynder ~~the~~ or hurt the other of them

The 11 devise

Yf that you have any principall shipps
of great store of ordenaunce and for feare
of those dangers before spoken of least
anye shipp doth come a borde / then yt is
best for to prepare certeyn stronge maste

for to putt out at the porte round about the shipp
and to have peces framed wth bolts wth out
bord 20 or 30 foote from the shipp ~~and to~~
from one maste unto another that no shipp
may come betwene them and those framed
mastes may lye wth them aboard untill such
tyme as occation shalbe to use them and
to take them in and putt them owte at the
pleasure as nead of service doth requier

The 12 devise

* Yff that yt happen so that there is any
plase where there is an exploite to be doone
as the aydynge of any plase eyther wth
men or victualls or such other lyke and
there is ordynance so placed at the entrance
that yt seemyth nott possible to passe ytt
for that the ~~channell~~ cometh so neare unto
the ordinance yett by this meanes at a sodain
yt is possible for a whole fleett to passe as
this prepare 2 or 3 great olde shippes more

or lesse accordinge unto the discretion of
them that hath viewed the place where
the ordinaunce is planted and then when
that you doe meane to pass with your fleett
then sende a convenient tyme rounde a grounde
with those olde shipps right in the face of
the ordenance with all their sayles standinge
and thus they will shadowe with their holdes
and sayles all the rest of the fleett till
suche tyme as they shalbe past the principall
dainger of the ordenance

The 13 order

If you have layd any shipp a boarde *
and you doe perceave that he hath made a
trayne to thentent that when you have
entred your men to blowe them overbord
to prevent that doe this first prepare certen
earthen pote of purpose that will holde
2 or 3 pounde of powder more or lesse
at your discretione and at the potte
have 3 or 4 lyttle eares round about the

pott syde it you maye make a littell
peace of matche fast there unto upon
eyther syde of the pott and this potte
beinge filled wth powder and the mouthe
of the pott stopped close and the peaces
of matche sett one fire then wher that
you doe throwe where that the trayne
is made ther throwe in this potte and
then the fall of the potte will breake
the pott and then the matche that
hangethe by the pott syde will sett
the powder one fire and so sett fire
one ther trayne ytt and also this potte
be verry necessarye to be throwne
wher as menne do stand thicke for
to burne them and amase them wth the
the powder and also of this potte they
maye throwe in the thickest fyght
of the shippe to mase the men and so
by yt meanes they may the rather entre the
shippe

The 14 order

To careen a shipp that she shall nott
sincke first lett her be sufficiently
ballasted and then prepare as many
caske as halfe the shipps burden cometh
unto and lett all the caske be mayde
close and tyghte that no watter may
come into them and then the caske
beinge layd close unto the ballast &
stowed downe close that they do nott stirr
then the shipp will nott sincke for any
leake for the caske will make the
shipp swymme and the ballast will make
her beare her sayle the lyke may be
donne by the makynge of close hatches
so that the orlope be under the watter
& that the scuttells be tyghte &c

The 15 order

And furthermore for to make provision in a shipp
that your men be nott spoyled with great ordynance
and especially to prevent the chayne shott and
crossbarr shott or chaine shotte and gett your men
to stand in a readdines at all tymes then doe

thes first prouyde Ellemen plancke of a 4
or 5 or 6 inches thicke or any other plancke
of suche wood as will nott rentt or splitt
and then in suche a convenyente place under
the decke lett yt be strongelye stanshed
all a longest in the myddell of the shippe
wth two rowes of stanshones and to be
4 or 5 foott a sounder between the two rowes
of stanshones and then lett that be plan
ked wth those planckes the two rowes of
stanshones and that wilbe lyke the case
in a galley that the cannon lyeth in and
and then that donne throwe in all the
olde roppes that you can gett and fill that
full therwth and then when that you
are in fyght wth your enymyes then looke
of what syde that he is of you then those
men yt are nott occupied other abought the
ordenance or a tacklynge of the shippe may go
unto the farther syde of those planckes to
be saffe from the violence of the ordenance

or spoylinge of them wth the shott for the
peopple that ar wth in the ~~barre~~ will kill
the violence of the shott and espetially
ye crosse barre shott or cheyne shott which
is ye cheeffest spoylinge of men and
and yett nott wth standinge ye men ar in
a redines when soever that you haue
any occasione to vse them whether
that it be either for to enter the other
shipe or to defend that shipe that
you ar in

The 16 devise 12
ffor the preuention off ye [illegible] devise
[illegible] is to staye to lett them yt shold passe
by any bullwarke or plattforme
~~for the preventione ye to depar~~ the moust
cheyne ther haven or harbor and yf
yt it be of any great bredthe then it must
be doone in this manner for that the
cheyne ys of such of great weight
yt it is a most unpossible for to make any

yt the hand no chayne when it is so darke
that the warche of any castell o bullworke
can nott see them. to make fast some great
cabell crost the watter and to under some
ye sayd cabell wth botte

The 17 daye

Iff yf ther be any shippe yt you woulde
brynge into any haven or harbarr and ther
is a barr yt you have nott watter soffysent
fnote for to brynge her in yett by this meanes
you may brynge her in ffyrst yt fyrst prepare
tow great hoyes or lyghters and lett them be
mayd fast ye one on ye tone syde and the other
and the other syde in this manner prepare
stronge cabells or hallsers yt ar verry strong
and make ye lyghters fast wth those ropes
unto ther hed and stearne of the lyghters and
make them fast unto the shippe and the more ye
better but lett nott those fastes be to toffte or fast onlyght
but resonable slack and then heave all
the ballest cleane out of the shippe

how great lyghters accordynge as yow
doe se cause to have ye tonnne and then
prepare longe and stronge great maste
or longe and stronge great tymber that
may be so longe that yt may reche ye bredthe
of the shipe and the bredthe of bothe the
lyghters all at once and then make
ffirst ye lyghters fast as before declared
and then have owte all the ballest in to
those lyghters and then ye lyghters beynge
loden then make certayne holes thorow
bothe ye sydes of ye shipe and then put
those longe and stronge great tymbers
thorow bothe ye sydes of the shipe in suche
sort that it may lye crosse bothe ye sydes of
bothe ye lyghters and then ye lyghters
beynge loden and brought under those
longe maste and tymber and ye tymber
beynge close unto the lyghter and allso the

shipp to reste vppon yᵉ loweste tymber then
haue oughte all the ladynge of the lyghters
and then yt will lyffte so many tonnes
as the ladynge of the lyghters cometh vnto
so by this meanes you may lyffte any shipp
or to whatt proportion you lyst for yff
there be not ballest ynoughe in the shipp to
saue your turne then the lyghters may
tak in more ballest a cordynge vnto the
tonage yᵗ you wold haue yt

The 18 chapt Staticke

To knowe the trewe wayghte of any thinge yᵗ
* swymmeth as the wayghte of a shipp wᵗʰ all
ladynge and furnyture yt is thus knowne
all thynges that swymmeth vppon yᵉ watter
yt is equall in wayghte of so much watter
as the proportion of yᵗ parte yᵗ is in the
watter yᵗ is to saye any thinge yᵗ swymmeth
loke how depe yᵗ yᵉ sayd thinge is in the
watter from yᵉ bryme of the watter downe
warde yf that there were any vessell mayd in yᵗ

from and sydes in lenght bredthe &
depnes and that beynge filled wth watter
the watter ys equall in wayght unto that
thinge yt swymmethe uppon yt the watter
neither more nor less and then to knowe
ye wayght of a shipe then measure the
proportion of the mould of a shippe as
thoughe yt yt war all one peace of tymber &
and then looke how many foott of tymber
yt it is and then way a foott square of the
watter yt the shippe doth swymme in and
then mulltyplye the wayght of that watter
by the content of the number of foott of ye
mould of the shippe and yt shall shewe
unto you the trew wayght of the shippe
wth all her ladynge and howe to measure
the mould of a shippe I do declare in the
second chapiter of the 4 part of my
booke called the tresure for travellers
and allso in the thurd chapiter and
4 part of the sayd booke I do shewe
a more easier and more pleasanter way

yt any man may do yt at home in his
chamber by ye arte staticall

The 19 document staticke

To knowe the trew wayght of any thing
yt is sonke in the watter to be wayed
from the bottom unto ye bryme of ye water
yt is to saye to knowe howe many pounds
will way yt ye wayght of the thinge beynge
knowne beffore that yt was sonke whether
yt it be mettall or stone or whatt soever yt
be elles / this is generall for ever yt yt wayt
so much in the watter as it in wayght more
then the proportione of so much watter yt
ys to saye looke howe muche yt ye mettall
or stone ys heavier then ye quantitye of soe
muche watter then abatinge ye wayght
of the watter then yt which doth remayne
shalbe ye trewe wayght yt ye mettall or stone
doth waye in the watter and to knowe ye
wayght of any sonken stoff / do this take
off that sorte of mettayll stone or other kind
of stoffe yt is sonke some smaylle quantitye

and then way the sayd stoffe and then putt
off that water yf the matayll is in to in to
sum barell or other vessell and marke the
vessell at the very edge off the watter rownde
a bowght it and then put in the sayd wayed
mettall in to ye watter and yt beyng doone
take owght all the watter yt is rysed a
bove the marked place in the vessell and
shead none of yt watter and then waye the
watter and that beyng done then devyde
ye wayght of ye great mase off metall yt
is sonke by the nomber of the severall quantite
of mettall yt you have made your proffe
by and then molltyply ye wayght of the
watter by the nomber agayn and that done
subtra or take a way the wayght of the
watter from the wayght of the mettall and
yt which doth remayn shalbe the trew wayght
of the sonken mettall to be wayed up from ye
grownd unto the bryme of ye watter as I do more
at large declare in the 4 and 5 and 6 chapter
of ye 14 part of my book called the tresure of traverses

The 20 devise

ffor that y knowe it is necessary for to knowe
how for to way a shipp or any other thinge that
is sonck into the water and for that the
labor shall nott be lost in the doinge therof
they ouer knowinge howe many tonnes will
way the said shipp then when they have
prepared of many hoyes and lyghters as
is able to way y^e sayd sonken shipp then to cause
every one of the said hoyes or lyghters to
lyfte ther proper burden they muste be
ware for doinge as they doe comonlye vse ytt to
make ther ropes fast unto ther hed or ther
stearne yt will nott lyfte not a quarter of
ther burden and beynge made fast unto
ther syde they will nott lyfte the 10 parte
of ther burden therfor they must prepare longe
and stronge great mastes or longe and stronge
great tymber and to prepare so great hoyes
or lyghters of sufficient burden to lyfte
y^e shipp and then to lay the sayd longe

tymber crosse bothe the heydes or lyghters overt
bothe the sydes of them and then make there
fast over the tymber and nott under the tymber
so that ye tymber shall beare the holl burden
therof and then to make fast all there
cabells or great ropes at a lowe watter and
then it will lyfte it or way it as ye flowd
ryseth untell a full see and then goynge
in unto the shorewardes and lett it rest
and at ye next lowe watter to make there
ropes faste agayne as I doe now at
large declare in the 7 chapter of the 4
part of my booke caled the tresure for
travellers

The ~~ij~~ 21 devyse

as touchinge this howe for to way it
thoughe in suche a place wheras it
doth nott ebbe and flowe then yt behoveth
to prepare as many lyghters or suche
kynd of vessells as will way 8 or 10

tymes y^e burden of that thinge yt is soonke
and then to have as muche then som or
wayghte cleane ballest as commeth unto 3
or 4 tymes y^e borden or tonnage of the wayght
of the thinge yt ys wayghed in the watter
and then lett all this ballest be devyded
in ~~bowgh~~ amongest all y^e sayde lyghters by proportion
accordyng unto y^e tonnage or borden of y^e
lyghters and then ~~lett~~ all y^t ballest be
throwne into y^e one hande of every of the
sayd lyghters / and then make fast the
hodden handes of this lyghters unto the
cables or stronge roppes and then carry
or cast all that ballest unto the other end
and then it will way the sayd soncken shipp
as yt is mor at large declared in the 8 chapter
of the 4 part of my booke called the treasure
for travylers

The 22 devise

As touchinge this how for to make the
roppes fast unto any soncken shippe yff that

yt be sonke very deap in the watter that they
may com by no part theroff at a low watter
then it is very tedius and dyffycolte to
make any ropes fast unto yt for that noman
may come at it to make any ropes fast unto
any stronge plac theroff yett the venetyans
and the Italyanes doth use to dive under
the watter which wee here in England can
nott do for to causes fyrst oure contry is more
colder then theres and secondly ther sea watter is more
clerer then oures for 2 causes the watter doth
nott ebbe and flow as oures doth so that the washe
off ther sea ys all wayes in one plac and ower
watter doth hye and lowe and ye watter somtym
beatynge in one plac and somtyme in anowther
plac doth caus ower water to be allwayes thick and
in lyke manner by ye meanes off the ebbynge and
fflowyng it casteth a tyde or strem to rome
to and from which will not soffer the watter
to be clear and allso ye venetians and Italyanes hav
when yt they doo dive under the watter a plac off

Thesinge to takke ayer or brethe in by some grett
vessell off metall off a soffisient bygnes and of
wayght and letdowne unto the bottom wt the botom
off the vessell derectly upwardes so standyng upon
3 or 4 feette upon the grounde in the bottom off ye sea
and beynge letten esseresly downe wt the bottom
upwardes yt ys all full off ayer and then when
yt they can nott hold ther breathe no longer then they
doe repare unto ye sayd vessell ye feate therof beyng
so hye that ye may goe easely under it and ther vnder
the vessell they do brethe them selfes wt ye ayer in
the botom off the sea &c but englysshmen be nott used
for to do that wherfore in my opinion this is ye
best way yt englysshmen may or can use to
make ther ropes fast unto any soncken ship
or vessell at a still watter yt ys to say at a low
watter or a full sea in the nyght to prepare sartayne
glases beyng mayd off purposs to be theyght yt
watter can nott gett in and to pout lyghte or candell
in them and then them downe wher yt ye soncken
shipe is so shall the se hon yt ye soncken shipe
lythe and so shall they see wher to take the best

hold of the shipp and then havinge p[er]ceved their
faintnes and their Ingenes they may take hold
of the sonken shipp at their pleasure for you may
see any light thorow the water and also any thinge
that is neare unto the light &c

The 23 devise

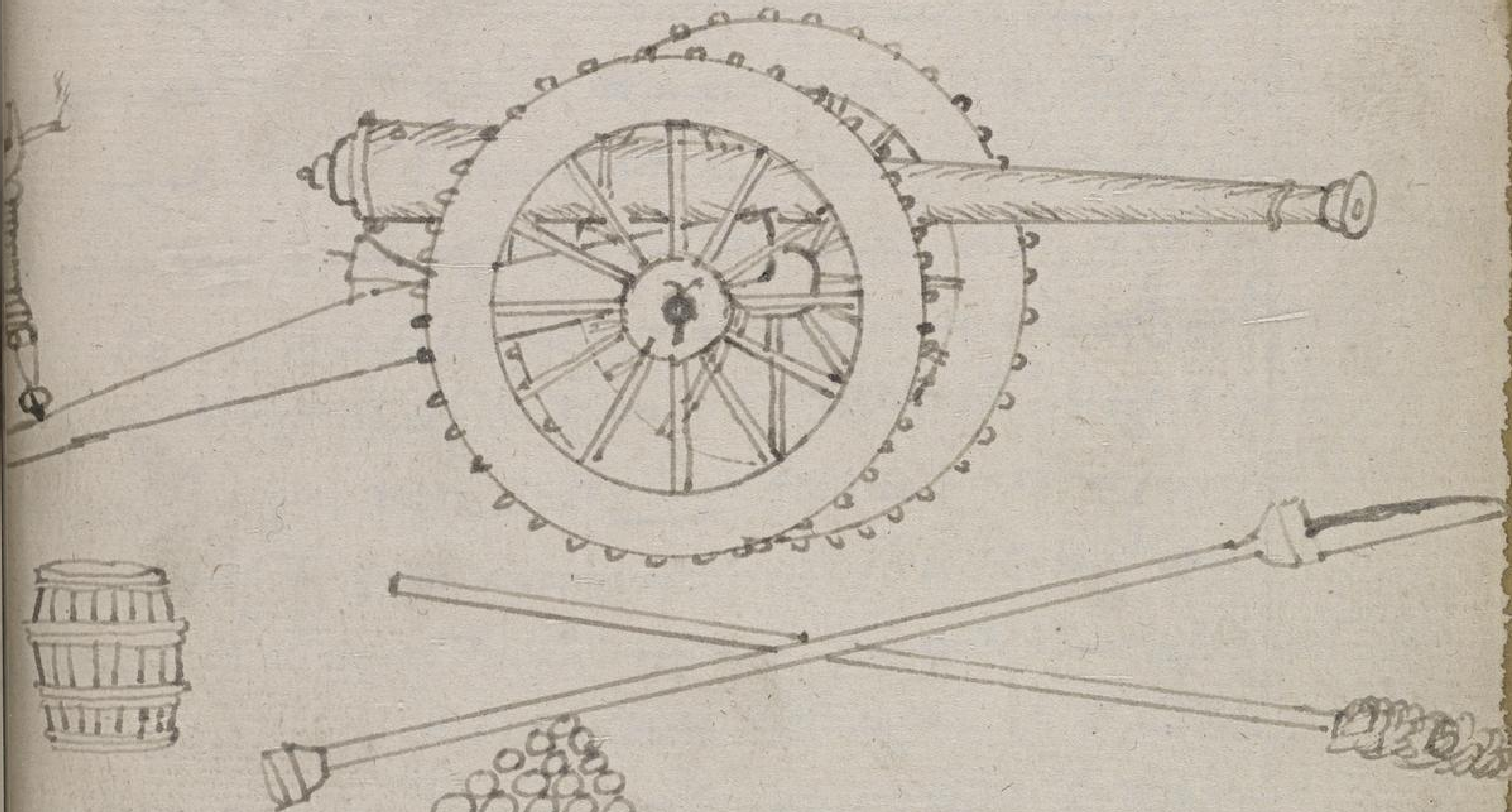
Yff that any shipp have a leake in her and will
not be fownde for that you cannott see where the water
doth com in then take an earthen pott and have
nothinge in the pott and then take a bowle and
and sett the mowthe of the pott upon the bowle with the
bottom upwarde and so sett downe the bowle with the
pott upon it in the holde of the shipp and then lay
your eare and harken unto the pott and yff that
you be neare unto the leake you shall heare the ronninge
in of the watter and the neares that you do com the
more lowder you shall heare it and the furder of
that you be the lesse you shall heare it so by the
removinge of it too and from you shall heare
in what place that it is in the shipp &c

The 24 devise

As touchinge this howe for to take a shipp and

order at your plesur unto what proportione yt
you lyste and so by that meanes you may come
unto ye Kettle off any shipe wthout any danger
for as sone as you do begyne to heave ye ballest back
agayne ye shipe will ryght agayne wthout
any fayller for where as the opinion off som persons
is yt ye shipe will not ryght agayne they are
notabelly deseaved and others [illegible] som be off that
opinion yt the ballest will slype whiche they ar
notabelly deceved for yt the ballest lyeth towarde
as the watter lyeth but in deed ye ballest wolde
slype yf yt the shipe was woond over for yt ye ballest
hangeth one way and the shipe is wond downe
over the other way then it must neades slype
yf yt yt be not made fast and also yt way doeth
hurt and strayne the shipe and yitt the shall
not so well come by ye Kell off ye shipe for that she
lyeth in a collpres for yt ye shipe is wounde one way
and the ballest hangeth the other way so yf that
she have but 40 tones off ballest ye shipe is charged
wth more then 80 tones for they most wynde
downe more then 40 tones to make her come

Dothe goe vpon the mast in suche forme that yt may
be so cleated yt he may sett his feet vpon the mast



dothe goe vpon the mast in suche forme & yt may
be so slacke yt he may sett his feat apon the mast
and the lennynge backwardes shall rayse him
selff and when yt his feat is as hye as he can
then he must geve his boddy in / and then
cam the wythe vp hyere wth his handes
at a soddane tyme and so by that meanes he may gett
vnto the toppe of the mast for in ye leanynge
backwardes ye hande thinge will nott slyppe / and
by this order ye maysons in tymes doe vse for
to goe vp vnto the toppe of a towre and yf yt it
be 60 or 70 fotte hyght wthout a scaffolde and
yf that the mast have tresseltres at the toppe
ther of then they may doe thus to make a smalle
lyne fast vnto an arrowe and so to shott yt ower
ye toppe of ye mast and then ye smalle lyne or stringe
will com ower ye tresseltres and then by yt smalle
lyne you may draw vppe a bygger and so stille
from the lesse vnto the bygger vntill that
you can such a one vp as will serve your
torne to go vp by

~~The~~ 26 ~~devise~~ of ordynance

As touchinge the levelinge of a gunn · or *

ryver by nyght in such sort that you woulde
haue no shipe nor other vessel to pass nether
by day nor nyght then you must devise some
ymmagened marck or markes vpon the
farther syde of the watter and then youe
must plant or lay your ordinar dyrectle
vpon those marckes and then in the nyght
you must plat lyghte in that places &
then yf that ther doth com any shipe
in the nyght they will shaddow or take
a way the syght of the lyght from
you and then you may be a shewerd
that ye shipe is ryght with ye mouth of the
peace and then your shote tyme of your
peace you shall hitt the shipe yf it
it be decerrtly hanuled as I do more
at large declare in the 27 chapter off
my booke called ye art of shootyng
in great ordenance —

The 27 devise

ffor to contynewe a battery both nyght

and day then must doe this when that all
your ordynance be laden and levelled unto
ye breche or markes asygned and wold
continewe the same day and nyght then take
your quadrant and loke at what degree ye
the peece lyeth and then plome ye myddell
of the mouth of the peece downe unto the
grounde and there make a marke and then
plome the myddell of ye tayll of the peece downe
unto the grounde and there in lyke manner
make a other marke and then drawe a ryght
lyne frome both the markes and the lyne
to be longer by 2 yardes then those 2 markes
and that done you may contynewe to shotte
all the nyght for the degree in the quadrant
will shewe ye peece the trewe hight of the
marke and the lyne under the peece will
ryght upon the marke as I do more
at large declare in the 25 chapter of
booke called the art of shootyng
in great ordynance

The 28 devise

How to plante ordenance in ye nyght and to shoot
thereby at any marck assigned do thus first seeke
ye grounde meate for your porposse and then take
an astrolobe and hange yt upon you thombe
by ye rynge and then torne ye alhedydary or
rulle wt ye syghtes up and downe untill
yt you do see ye marcke yt you do mean for to shoote
at thorow bothe ye syghtes of ye alhedydary the
the sd astrolobe for to hange parfettly uprygh
and then looke upon ye astrolobe at what degre
yt ye alhedydary doth poynt unto and kepe yt
in rembrance for that gyveth the poynt ye travis
hyghe of the marcke and then where yt you do
meane for to plant your ordenance there
marck a marck and then go backewardes
lyttell a dosen or 20 foote and then sett ye marck
yt you do mean to shoot at yt it be ryght over
ye marck yt you have made upon the grounde
and ryght wt yt marck marck an other marck

and then you a lyttell fordder barwardes & then were yt a gayth and so yt the marck yt you do mean for to shout at and the owther 2 marckes yt you have mayd upon the ground be all 3 upon one ryght lyne by the syght of your eye and yff yt they be nott then you may amende them and sett them ryght and then those tow marckes will rull the matter so yt you may lay the pece ryght apon the marck and then you brynginge your ordynance in the nyght tyme you may shoutt as sertly as I do mor at large declare in the 16 chapter of my book called the arte of shoutynge great ordenance

The 29 devise

As towchinge this howe for to shout at a shippe yt is under sayle in a ryver they must do this they must plant ther ordynance agaynst some imagened marck upon the fortherside of the water and then when yt they doe see yt the shippe doth begynne for to close the imagened marck that ther ordenance *

thyte ryght a gaynst then geve fyer
unto y^e ordynance and the shall make a
parfett shott as I do more at lardg declar
in the 13 chapter of my boke calld y^e art
of showtyng in great ordynance

The 30 devis

ffor to showt at any movable marke upon
y^e lond other at horsmen or at footmene
when yf you do see them com then plac your
ordynance upon some hyll or any other
marke yf it in the hy way yt the must com
bye or most specially at some plac wher
that ther is a tornyng for in a tornyng
then they doe tarry longest before they
be alltred from the marke and then it
is best showtyng of your ordynance for
to do any spoyll and allso upon the
lond you may trye what y^t any peace
will doo at any marke as tochinge y^e
lenghe of the lenght of the marke

As tochyng this for to showe what kynde
of shott is most metest for to be usid for
to doe servic in a feeld wth ther great ordenanc
as canons or colverynges at a great distanc
to shoote ye hole iron shott as you do at a
battery and as the doo aproch neare then
to shoot chaltton shott and as they do com
nearer chaltonnyst shott or smalle bass shott
and at hand all maner of sperlyng shott
as cheyne shott or tolver shott and dyce shott
and suche other lyke &c

the 32 devic

yff that you have a peec of ordenanc
yt is nott truly bored yt is to say yt yff that
the cane or hollowe do nott goe ryght in the
myddel of the mettall but yf yt doth leane
more ye one way then yt it doth the other
way yt peec will never shoot ryght upon
ye mark except they do this look whych
syde ye mettall is most thickest unto
that syde ye peece will cast the shott/ &c

and for remedye therof they moste do thus
fyrst they muste seeke howe muche ye mettall
ys moste thickest and that beynge knowen then
when yt you doe sett vp the dispart of the
peece you must putt halff ye dyversytie of ye
thicknes of the mettall yt it is thicker one ye
one syde more then it is one the other syde vnto
the lengthe of ye dispart and then you muste
sett ye dispart Iustly vpon yt syde and plac
yt ye mettall is moste thickest and then when
you doe make any shott wth that pece you
must have your levell Iustly vpon ye thickest
syde of the pece yt is to say ye mettall of ye
breche of the pece and the disparte and
the mouthe to be all vpon one ryght
lyne by the syght of your eye as as I
doe more playnly shewe in ye 11th chapter of my
boke called the art of shootynge of great
ordynance

The 33 devise

Iff yt any place be to be beseyged yt standith
one a marrish grounde so that it is thoughte

unpossyble for to brynge ye cannon unto
yt yett nott wth standynge it is possyble
by this devise bothe for to brynge the
cannon unto it and allso for to platt ye
cannon agaynst yt alltho that the grounde
be never so sofft first lett them prepare
a flatt bottom bote for every cannon and yf
yt it were a cannon of 8000 wayght the
botte but 20 foote longe and but 8 foote
brode yff yt botte war in the watter the botte
will sinke in wth yt cannon at one fotte depe
nes goynge in to the watter then it beareplayn
tase together yt it be marrysh grounde or owse
it will nott synck halffe so much to be drawn
over yt beynge in ye botte and the botte to be
made thyght yt no watter or dorte do the
come in and then yff the grounde be so sofft
yt they can brynge no horses to mack them
drawe it yett it may be drawne by men
and 80 men will drawe it and yf every
man doo drawe but 100 wayght the botte
to be mayd at that ende yt goeth forwarde

flattynge ye it may styck a gaynst nothinge & I
am off yt oppinyon that it is nott possyble to
make no better plattform to place thee ordenance
vpon then in the bott for yff ye grownd wear neuer
so softe yt can synke no ffuther into yt wear
softer nether as yt will in to watter & by this
meanes they may bothe brynge the ordynance
and place thee ordynance in any grownd how softe
so ever it be at ther plesure

The 34 doute

* Yff that it happeneth so yt you have any peace of
ordynance yt when you have loden her that
the shott will nott goe home vnto the powder &
yt ye peace ys so cloyed yt yff she be shott off the
peace will breake the them to save the peace &
vncloye ye peace do this for yff yt it wear in
any place of servis yff that ye peace do brek
there may happen 3 greatt damayges as this
furst ye lack of the thyng when yt they shold
use yt and secondly ye losse of the valwe of ye
thynge and thirdly the hurt that may
happen by that meanes &c and for to vncloy

the peece yff yt you cannott by no meanes skall
the peece do this first cleare ye touch hole of ye
peece and then putt in cleane watter at ye touch
hole untill yt yt doe stand full of watter and
then turne up ye breech of the peece yt the
mouth of the peece may stand droppinge
downe wardes and so lett ye water drype
owght of ye mouth of ye peece a 2 or 3 dayes
and styll putt in more watter & keepe the
touche hole full of watter and so by that meanes
ye watter will sucke owght all the potter from
owght of the powder in ye peece and then yt
beinge doone then you may prym fresh powder
in at the touch hole as much as may be sufficient
to blow out the shott yt is in the peece and in
that maner you may save the peece by settinge
some tobb or vessell under the mouth of the peece

The 35 [illegible]

yff there treason or owther enymyes have cloyed *
the touchholes of your ordynance and that you
have no drill for to bore yt owght upon the
suddayn and yett you ar drawen to use your

ordenance then shalle your peace both the shott
and the wad but nott the powder and then
put ~~ye~~ in lowser or smayller shott wthowght e
a wade and then make a trayne of powder
from ye powder in ye peace vnto ye mothe of ye
peace / and then laye levell vnto youre
enymyes and so gyve fire at ye mothe of the
mouthe of the peace and then ye force of ye
blast of the powder will blow owght the
nayll or spicke owght of ye tochhole but yf
it doe nott then heate the peace ther abowght
the tochhole and then tack a quantyty of wax
or clay and make it lyke a cuppe abowght
ye tochhole and then tacke oyle and heate it
hott and then poure ~~it~~ it apon the ~~th~~ tochhole
and that will so socke by ye sydes of the nayll
yt when you do lode the peace and shoute the gu
off as afore is declared and ther is no dowght but
yt it will blow owght the nayll and cleare the
tochhole of the peace

~~De~~ the 36 devise

* Also be yt it happneth for yt there is in ye peace

off an armye a watter by the way off greatte
deepnes and they havinge no botte and yf they
cane mack provision for to put over ther men
and nowe to taken over ther ordynance they
may doe this first wth planck and tymber
lett them mack a thinge square lyck a platt
form off sofecient strength and then lett
them plac one off ther peasses off ordynance
upon it and then lett them prepare emtye
caske and lett them be mayd thyght and
then tack as many off those caske as may be
soffysshent to beye or swym wth the sayd
peac of ordynance and then lett those
caske be mayd fast and trussed hard unto
the sayd plattforme a loffte upon the plat
forme for the plattforme must nott be upon
ye caske for the wayght off the peac wold
over thowe ye platforme & so they may conuay
the ordynance over any haven or ryver wth
owght botes and so the may mack as many
off those plattformes as ys suffishent to sarve
ther torne and you may knowe how many

shalbe will bere or swym(e) wth any peace
of ordynance as this 5 tonne of shalbe will
carry a dobell canon and 4 tonne will carry
a demy canon and 3 tonne and less will carry
a culveryng(e) and so forth takyng(e) any thing
more then a pece or boat unto 1000 wayght
of the peece

The 37 devise

* For to knowe whether yt any peace of ordinance
be soffisciently mettelled to beare hir powder charge
then this is generall yt in ye chamber before
the touchhole so farr as ye powder doth reache
to ye mothewardes yt ye mettayll ys in thicknes
as thic as ye shott rownd aboute and some
whatt thycker and yff yt the mettayll be in
in thicknes as much as the hyth of ye shott
then she is slenderly mettelled &c

The 38 devise

* ffor to know whether yt any peace of ordi-
naunce be clene wthin wthout any honycombes
or crackes then take a steell glasse wherin ye

somme shynethe and then torne the shadow
off the sonne to the mothe off the pece and so
you shall se into the pece whether ther be
any flawes or honycombes in ye pece by the
lyght of the sonne upon the glass & allso
yff the sonne shyne nott then take a short
candell end and then take a long stycke
yt may rech unto the bottom off the pece &
then make a clefte in the end off the
stycke and then putt the candell end in
ye clefte off thereoff and then put yt in to ye
mowthe off ye pece unto ye bottom yff you
se cause and so you shall se yff that ther
be any faltes in the pece in lyke maner

The 39 doctrine

And furdermor you may breake any pece
off ordynance allthoff yt the pece off ordynance
be suffisiently mettalled and with owght
crackes or flawes or honycombes and allso
havyng no more butt her common charge
or loadyng as this yff that it happened so yt
you myght com by your enemyes ordynance

and then beynge laden allredy you myght
cause ~~your~~ them to breake at ye mothe when they
off in this maner prepare certayn thyngs
mayde of Iron made of purpose of a fotte
longe or more at your plesur and the pont
to be verry then and sharp & smoth and at ye
other ende to be hallow and inche thyck or
more and to be smoth and taper frounde from
ye poynt unto ye greatter ende and then
putt into ye peace yt thinge close under the
the shott beynge rammd yt is apte to rowm
upon yt and then ye peace beynge shott off
ye shott will be choked or stuck fast in ye
peace by the meanes of the bygger end of
ye thing of Iron putt into the peace for yt ye shott
hath no rome for to goe by and then ye violent
blast of the powder must neades breake the
peace &c

The 4o devise

As I doe nott thynck yt unmett to shewe by
what order yt you shold vse your breake &
shent of your ordynance at a battery yt is to
saye to beatt downe or shake downe ye walles

of any towne or fortres and for ye beatynge them
downe in your geuinge of your levell and shew
tynge them of do this affter yt you haue planted
your ordynaunce ether in 2 places or in 3 places
as the place doth requier / but in my opinyon 2
places is sufficient unto one place to beate yt
downe to ye entent to make a breche and yf
yt it be unto a collyan poynt then it is best to
place your battery but in to 2 places and other
wyse as the place doth requier and then in
ye geuinge of levell doe this fyrst where as
you doe meane for to begyne for to make ye
breach and beyng but at one place off your
ordynaunce geue levell wth one pece below
at the bottom of the wall and wth the next
pece a foott hier ryght over yt and wth the
third ryght a foott over that and so forth unto
every pece at that partt of ye batterye saving
you neade nott geue ye levell unto no peace
more then 3 partes of ye hygh of the wall and then
in lyke maner geue your levell wth your peces
at ye other part off your battery unto yt place
yt ye other was layd ryght agaynst wth in
a fadam or more at your descretion as the

plat is so yt ye one plat may fflancke or beatte
a gaynst ye outher crossynge in ye myddell of
the wall and when yt you do meane to shott
them of then gyve fyere unto them all at one
at thes ye places yt they may all beatt and
shake ye wall at one tym togyther and then
it will beat it downe or shake it downe the
faster and the bottom beynge beaten a way
the tope will fall a way of it selffe and so
when yt youe have broken ye wall & still
to make it wyder then geve youe levell at
your dyscretion upon the wall obsarvynge
the order beffore rehersed bothe in levellyng
and of ye gevyng of fyer unto the peces

the 41 devis

* As touchinge in the geevinge of levell wth any pece of ordinance and for to know yf yt ye levell be layd a wrye and to know howe much a wry ye shott will be at ye marke yt is thus knowen looke how many tymes yt quantety yt the pece is layd a wry so many tymes yt quantety yt the lenght of ye pece is unto ye mark

so ~~many tymes~~ it shoulde a wry at ye marke
as for ensample ye peace is 10 foote longe
and it is layd one ynch a wry besyde
ye marke in the levelinge of leuell and ye
marke is 20 score from the peace and there
is 6 tymes ye lenght of ye peace in every
score and ye marke beinge 20 score off
then ye shott shalbe 6 tymes 20 ynches
besydes the marke and yt is 10 foott as I
doe more at large declare in ye 10 chapter
of my booke called ye art of shootinge in
great ordenaunce &c

The 42 doute

Iff yt any place be beseged and have no
ordenance ffor to deffend them sellffes as
many tymes yt in ye mydest of a contrary yt
ar nott neare ye ffrontiers there may be great
cittis and townes yt ar well walled yt hath
no ordenaunce and many many tymes ~~lack~~ dy
vers thinges nott to defend them sellves as
powder and shott &c and yett they have strenght
ynoughe of men to defend them sellfes and yett

nott wthstandynge they may macke provision
for to macke both ordynance and allso powder
and shott & all those yt they have no other
mettall but only leade and ther is lyghtly in
no cytey nor towne but that it hath leade
good store / and then they may macke them
ordynance of leade to serve there torne by
the good forsyght in ye castynge thereof yt
is to say to putt in ye more substance of the
mettall for lett them macke ye thycknes of
ye metayll to be rounde a bowght ones and
a halffe ye hyght of ye shott ye peace will
be able to beare ye ordenary charge off
powder and then ye wayght of that peace
will be mor then dobell ye wayght off ye peace
which is of brasse or Iron and in a towne
where as is heale Jn noth yt maketh no
great matter for the wayght for yt they have
no great cawsse for to transporte yt verye
farre / and allso they must nott shoutt in
those peases to often at a tym for heatynge
of them to hott ~~for~~ but they may shoutte

in all poynte and yt is by this meanes
the shotte to be bothe fytt for ye peace then
prepare a peace of lynnen or wollen clothe
and then woold yt same rownd a bowght ye
shotte yt ye shott may goo stiffe in to ye peece
that it may goe home vnto the powder &
in so doynge you shall shewtt further then
it woulde do yff yt yt were vnwolded and
allso yff yt yowe do shewt in a peace bothe wth
one kynd of shott and wth one wayght of powder
and that advantayge in all poyntes ye last
shott shall over shewt ye fyrst by this meanes
for that the peace is mayd warme and yt
cawsethe the powder to fyer ye better together

The 44 devise

As towchynge this how for to lade a peace
at one tyme and to make ye peace to shewtt
3 tymes of at one lodynge of ye peace which
is downe in this manner first prepare
a peace of small mache yt will kepe fyre

or elles a peace of flex threde and yt it will
kepe fire and then putt ye one ende of yt
in to ye mowthe of the peace so that ye ende goe
vnto the breche of the peace and the other
ende to hang owght ~~of~~ and then lode ye peace
but meanly so yt she have not her full charge
and then putt close wade and then laye ye
peace but meanly agaynst wth som what lesse
powder then it had at the first and then
putt in an other close wade and yt donne
then lode her the third tyme and putt vp
the powder close but you need nott wade yt
except you list / and then sett the ende of
the thred a fire and yt will fire the first
and make ye peace goe of and yett the
thred burneth still and so throwgh of
ye myddell most and afterward yt burneth
vnto the last and so the peace hath
shott of three tymes and this you may
doe by handlynge yt decently and
make shewe at a shott at every tyme
&c

The 45 devic

* ffor to make a peace to goe of at any hower
or tyme apointed allthoff ther is no person ther
to geve fier unto the peace yett this you may
doe and yt will goe of at any tyme apoynted
as this furst the peace beynge charged take
a mache and prove what length of it will
be burned in an hower and then you knowe
ynge justly how much in length will be
burned in a hower then accordynge unto that
tyme that you wold have the peace goe of them
cut sure owght so much just in length as will
be a burnynge in that tyme and then at the
place lett yt be layd at the toch holl, the peace
beynge prymed to lay powder uppon the mach
and then the other end to be fired then when
that the mach is burned unto the powder then
the peace will goe of and so by this meanes the
peace will goe of at any hower or tyme apointed
whether that yt be in long tym or shortt tyme

The 46 devic

for to make a peace goe of when that you lyst
you nor no other parson beyng there for to geve

fire unto it then you must doe this ye peace beyng
loden and prymed then in the tochholl then take
a peace of smayll wyer of 2 or 3 inches longe
and bend it that both the endes may come
to gether and then put that in to the tochholl
of the peace when that the peace is prymed
and the bowght endes to stand upwardes
and then put ye ende of a long stringe ther
row yt and then lay a lyttell powder upon ye
tochholle and then make a peace of matche
ffast unto it and lett ye match be lyghtted
and then ye other ende of the lyne ~~[illegible]~~ you
may carry where you lyst and then when yt
you wold have the peace shott of then draw
or pull ye lyne or stringe and yt will geve
fire unto the peace &c/ allso you maye/
sett fire one powder wth a burnyng glasse
where the sonne shyneth &c

The 47 devise

for to know whether ye any peace of ordnance
be trewly bored that is to say yt the boore or
hollownes doth goe ryght in ye myddell of

the mettall yt it doth nott declyne or cane
more unto ye one syde then unto that yt doth
unto the other syde and for to knowe yt doe this
take two ryght staves and make them faste
at the one end or ther candick^ they be nott wyder asonder
at the one end then yt they be at the other
end and so maid fast yt ye do nott swarve
and then putt one of the staves into the
mowth of the peac near unto ye tuchhole and
then try ye peac round a bowght on every
syde wth an ynch rulle and so you shall knowe
whether yt ye tore or hollownes doth go ryght
in the middell of ye mettall and yff yt doe nott
you may knowe by the ynch rull how much
yt yt doth dyffer &c as I do more planly shewe
in the 2 chapter of my boke called the art of
shewtyng in great ordynance

The 48 devise

ffor to knowe whether yt any peac of ordynance
be tapered bored yt is to say yt it is wyder at
the mowth then yt it is neyther in towardes ye
breach of ye peac yt youe shalle knowe by

swarve in ye delyverance and allso ye shott
will nott flye so ffarr as yt woulde doe
yff yt yt war clere for ye mowthe of the
peace &c nowe those tapered bored peses
yt be made ye worse as those yt ar allso
off one hyght &small ends in a ffott or a
foote and a halff off ye breche ends and after
wardes unto ye tochhoole is narrow & narrow
these peces ar nott the worser but rather
the better in some respectes for yt yt is
ye stronger so yt ye shott may goe closs unto
the powder for ye greatest faulte yt may h
happen by ye meanes ys this yt ye plat off
ye ladell most be ye rownder bente and all
so in ye skowringe there may be a fault for
yff ye sponge be to bygge yt will nott goe
unto the bottom and yff yt be fytted ffor ye
bottom then yt wilbe to lowe for ye rest
of ye peace &c

The 49 demande /

ffor to knowe how thycke yt any peace ys

in mettall in everey place you may know
yt by ye 44 done goyng beffor as you doe
trye whether ye peace be truly bored &c
and allso yff yt ye peace be trowly borred
you may trye ye thycknes off ye mettall in
this manner take ye thycknes off ye gold
mettall wth your calleper compases upone
ye owght syde off the peace and then tryt wth
ane Inche rull how many Inches yt it is
all in thicknes and then take away ye hythe
off ye mowthe off ye peace frome ye hole
thicknes off ye mettayll and then loke what
doth remayn then hallff yt shallbe ye trew
thicknes off ye mettalle off ye peace * in that   * of yt shot bore
place yt you haue messuerd and by this
meanes you may knowe ye thicknes off
ye mettayll in euery place &c / and allso yff
yt you haue no caliper compases then
you may plom the pece upon both ye sydes
wth a plomett off lead upon a stryng by layeng to
a to fott rull cross ye breadth off the peace

doynge after the maner as beffore is rehersed
and allso yff yt it be a rownd peace then you
may gyrde ye peace and so fynde ye thekenes
off the hole mettayll &c as I haue declared in ye
4 chapter off my booke called the art off
shootynge in great ordenance

The 50 dem

The cause why yt ye cannons and other
other great ordenance doth nott shoott so much
powder in wayght as ye shotte wayeth all
thowgh yt ye rule and order of ~~[illegible]~~ ye founders
off ordenance ys to cast ye thekenes off ye
mettayll as much as the shott is in heyght
off all sorte off peces as well in cannons
as in all other sorte off peces and yett they
may nott haue ye wayght off ye powder yt
the shott wayeth as all smayll ordenance
hath and the ~~more~~ cause theroff growethe
by this meanes for in the doblinge the
thicknes off the mettall off the peace yt doth

but In suche as a plattforme or sweders shetwell
that is for dobell measure to be 4 tymes the quan
tetye and as for the shott in the doblynge of the
measure yt ys 8 tymes the quantetye and so yt
is in all bodyes as tubes and suche others lyke
as I doe declare at large in the third part of
my booke called the treasure for travellers
and yett you shall have this Insample here
by a shott of 3 Inches hye and that shott wayethe
lyttell more then 3 pounde and a halfe the peece
beynge a mynyon and the mettall ys 3 Inches thicke
and now I have an other peece that the shott ys dobell
the hyghe that is 6 Inches hye and the shotte
will waye more then 28 pound and now the
mettall beynge dobell ys but 6 Inches thicke
and the bygger shott is 8 tymes the bygnes of the
lesser and the measure but doble but nott withe
standyng the dyversitie is nott so muche as yt
semethe for yff that bothe the peeces war cast off
one length and dobell in measure in som partt
in all places then the bygger peece sholde way

4 tymes ye wayght of ye lesser &c and thes is ye
cawsse yt ye canones must nott have ye wayght
in powder of ye shott wayght for ye wayght of
of ye pece and ye wayght of ye shott must rull
yt matter as I doe planly shew in ye 3 chapter
of my boock called the art of shewtyng in
great ordeynance &c

Page 51 downe

ffor to knowe how many Inches or what part
off an Inch will make a degre in any pec
of ordeynance to be levelled at any marke wth
an Inch rull yt is thes knowne fyrst mesur
ye length of ye pece how many foott yt is in
length and then dobell yt mesur and then
molltyply yt nomber of ffoott in to Inches yt
don as 7 unto 22 soo ys the circomference of
such a circle yt is to say first molltyply the
nomber of Inches of dobell the length of ye pece
by 22 and loock whatt yt commeth unto devid
yt agayne by 7 and yt will shew ye circomference
of such a circle and devid yt nomber agayne
by 360 and yt will shew unto you how many
Inches and partes of an Inch will make a

a dosyn &c as I doe shew howe mane Inches
and what partes of an Inche will make a
Dosyn for ye length of sundery peces in ye
6 chapter of my booke called the arte of shoo
tyng in great ordynance &c ×

The 52 devise

As touchinge this howe for to shift or place ordenance
in a shippe this is to be considered first that
yt ye carredge be made in such order that the
peace may lye ryght in ye middell of ye port
and yt ye trockes be nott to hie for yf that ye
trockes be to hie then yt will kepe ye carredg
yt it will nott goe ~~close~~ unto ye shippe side and
by yt meanes ye peace will nott stand close ryght
of ye port except yt it be of some reasonable
length and also yff yt ye shippe doth heele
that ~~wayes~~ then ye trockes will allwayes c
come ~~close~~ to so that yff yt you have any occasyon
to make a shott yt you shall nott bringe ye trocke
off from the shippes side but yt yt will comme
to agayne and ye trocke beynge hye yt is
nott a smaull thyng under a trock will staye yt
but yt it will come over yt &c and also yff yt
the trockes be hie yt will cause ye peace to
have ye greater recoyle &c / ther fore ye lower

the port for then the caryages must be mayd
verry lowe and yt is verry evell in dyvers res
pectes for then in the shottynge off ye pece then
yt is apte to overthrow and allso in fowle wether
yt is apte to overthrow by ye ~~[illegible]~~ labourynge or scellyng
off ye shippe &c and farder more you moast have a consyderation
for ye settynge off your ordynance in ye shippe as
thus ye shorter ordynance is best to be placede
owght off the shippe syde for 2 or 3 causes fyrst
for the ease off ye shippe for by the meanes off ther
ther shortnes they ar the lyghter and allso yff
ye shippe shold heale wt the berynge off
a sayll yt you must shott ye porte then yt pece
is the easyer to be taken in both for ye shortnes
and the waight and allso in lyke maner the
shorter yt ye pece ~~[illegible]~~ lyethe owght off ye shippe syde
ye lesse yt shall anoy the shippe in ye tacklyng
off the shippe scelles for yff yt ye pece lye
farr owght then ye shottes or tackes or bolynes
will allways be ~~ffild~~ fowlle off them &c / and yt
is verry good for you to have long ordynance

to be placed ryght out of ye starne of ye shipe
for soo praunses ye one as this ye peace must lye
very far owght for elsse in the shewtinge yt
may blow up the counter of the shippes starne
and allso ye peace had nead be very longe for
elles yt willnott rache very farr out for the
worke of a shipe starne hangeth outward
from ye decke or orlope upto the poupe so yt
ye cardge may be close below but nott aloft
Lykewise allso yff yt you have any chasinge
peacess to shoot ryght forwarde then they
must be longe Ordynance in like manner

The 53 devise

and furdermor as touchinge ye markinge
of a shott by sea owght of one shipe unto anoth
owther this is to be considered ye heavinge
and settinge of ye two shipes and allso the
strength as I do more at large declare
in the 14 chapter of my booke called the
arte of shootinge of great ordenance but yt
geve levell unto any marke or shippe for
the ryghtnes therof this is the best way in

a shott nott to stand poringe at the breache
of the peece as yt ys comonly vsed amongest
gonners butt but to geve levell ryght to the
you havinge geven ye peece ye heyght yt she shall
lye at then as you shall se cause bye hem yt ys
at the helme to you a loofe out rounde and then
sett one stand redy wth a lyntestocke to geve
fier and then stand you ryght behynd ye peece
a too or 3 yardes of and then marke the my
dell of ye mouth of ye peece and the myddell off
the tayll of the peece yt by ye castinge of
the shote be ryght wth the marke by the syght
of one of your eyes then profyer and you
may be asured yt ye shott goeth ryght &c

The 54 chapter

As dyvers gonners and other men have devysed *
sondrie sortes of fire workes for the annoyance of
their enemies yett as farre as ever I have seene or
harde I never knew nor hard of any good
service done by it neyther by sea nor by land
but onely by powder and that hath done
great service for that the force of it is myghtie

and cometh wth such a terror butt for theire other
fire workes it is rather meetest to be used in
the tyme of service in the nyght then for any
service and for to make this kind of ball doe
thus prepare the mowld of a dobble chaininge shott
and that is 5 Inches hye and then take claye
and make yt rownd in a ball as much as a myn
lett
mynone shott that is 3 Inches thicke and then ^ it
be dried as the founders doe use to drye theire
mowldes and then sticke that claye round about
wth Iron nayles leaving the nayles a Inch wth
owght the claye and then putt that mowld of
claye into the mowld of the chaininge shott and
looke yt the nayles doth so beare that the ball
of claye doe stand right in the middell of
the mowld of the chaininge shott and also
much the mowld of claye so that yt maye have
a touch hole to come into ye claye and then take
bell mettayll or other coorse pott brasse and then
fill the mowld of the chaininge shott wth that
mettall and that beinge done then yt is fin-
ished and so make as manye of them as youe
list and then that beinge done then putt owt

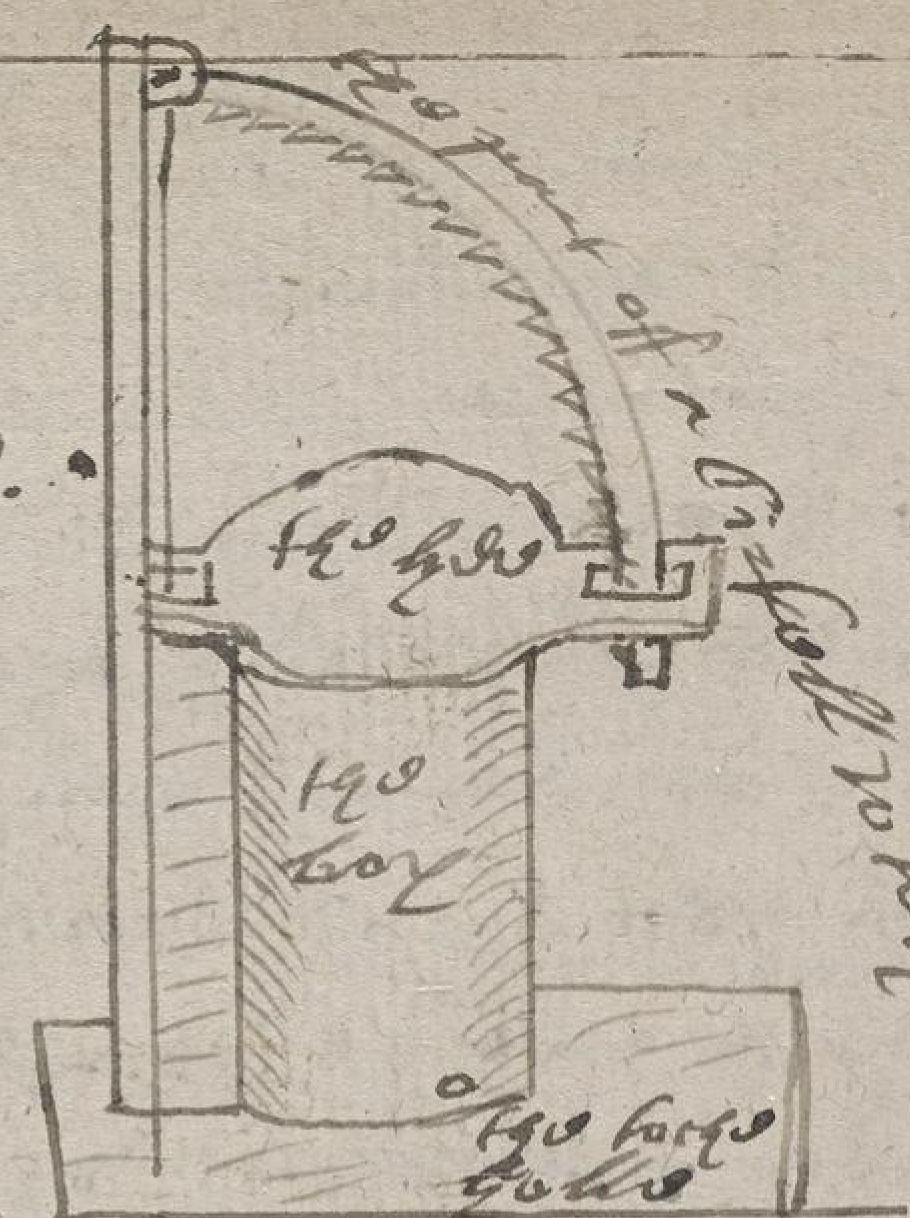
all the clay agayne that is in the ball that was
cast in ye culveringe shott mowld and then fill yt
wt good corne powder and then that beinge
filled were full then take some resbat off softe
fierworke that will nott burne to hastely and
and fill uppe the rest off the ball and then
yt is perfectlie finished and then in the tyme
off service eyther by sea or by land yt is very
good to throw in amongst your enemies where
they doe stand thicke as they be very good to de
fend a breache or such other lyke cases as
as this to take yt in his hand and to fier it and
then to throw yt in amongest your enemyes and
then as sone as ye fierworke is burned unto
the powder then the ball will breake in a 1000
peces and every pece will in a maner doe as
much hurte as a harquebusse shott so that ther
is no kynde off fiere worke comparable to this
kynd off ball for service in the tyme of warr

The 55 item

and as touching this how for to make
an instrument or ingyne for to know the
goodnes or the badnes of powder yt is to say
to know ye strength or weaknes thereof they

may doe yt in this maner first macke in
mettayll or Iron a rownd box of an Inche
and a halfe in bredth mor or lesse at youre
dyscrytion and of 2 Inches deape more or lesse
at youre dysscrytione and then lett yt be placed
so yt yt may stand vpright and to have a
lyttell towchholle at the lower part thereoff
and then lett ye vper most part at ye mowth
thereof have in mettall or Iron a lyde or cover
yt may goe wth a Ioynte vpon ye syde thereof
and ye cover or lyde to be of a resonabell
weyght and ye other syde of the cover or lydde
ryght agaynst ye Ioynte to have a sqware
holl fitted of purpose and then vpon ye syde
yt ye Ioynte of the cover or lyde ys off
ther most be rayssed a thyng yt must have
in Iron or other mettall a part of a whell
and ye dande of yt must goo thorow ye sqware
holl in the lyde or cover and ye other end
to goe wth a pynne or Ioynte ryght over the
Ioynt of ye cover or lyde and the sayd whell
thrughe or part of a whell to have tethe

or notches lyke unto ye teeth of a shaw and ye
teeth to stonde upwardes and then yt is fyni-
shed and then when sever yf you lyst too
prove ye strength of powder and you havyng
of dyvers sorttes of powder then way som small
quantyti of ye powder and then putt yt in to the
box and then lett downe ye cover or lyde and
then geve fyer unto yt at the touchole and
then ye powder will blowe upe the cover or
lyde and then ye teeth or notches beynge well
fyled and trymed of purposs will hold upe
the lyde at ye hyest and yett not staying the
blowyng of yt upwardes for yf ye teeth stondyng
so to stay yt yt yt shall not com downewardes
and then tryynge or provyng of dyvers sorte
of powder you shall knowe which ys the stron-
ger powder or ye weaker powder by the blo-
wyng up of ye lydde or cover you puttyng
in the powder by wayght &c and thes the
forme of the ingyne or instrument on the
other syde ye leaffe &c



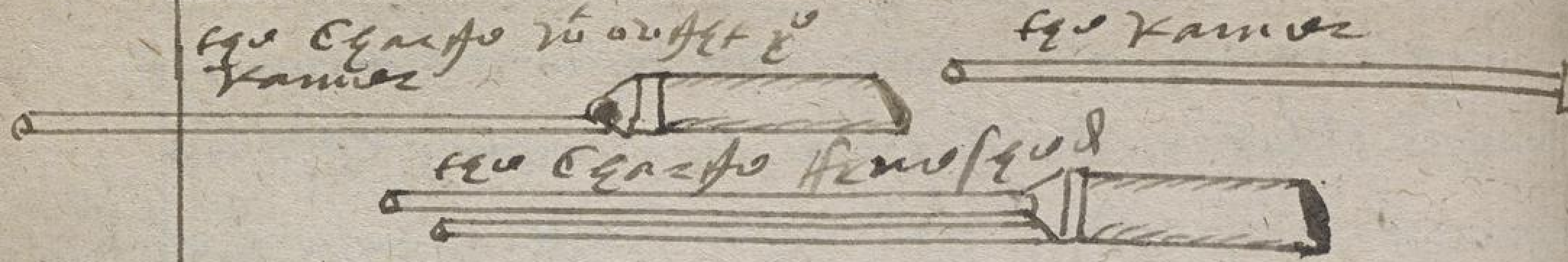
The 56 devise

And further more for that J have seene the
Jnconveniens therof as touchynge ye ladynge
off ordenance in shypes and especially off those
ordenance yt ar under ye deckes in ye tym off ser
when yt they do charge ther ordenance wyth
a ladell yt is verey combersom for that the
ladell must alweys filled and ye twye tornyng
off the rammer hed is trobellsom in a shypps
rome besydes ye openness off the powder in ye
doynge therof wherby yt ther may grow
great inconvenience yff yt they be nott very
circomspect in the doyng therof and further

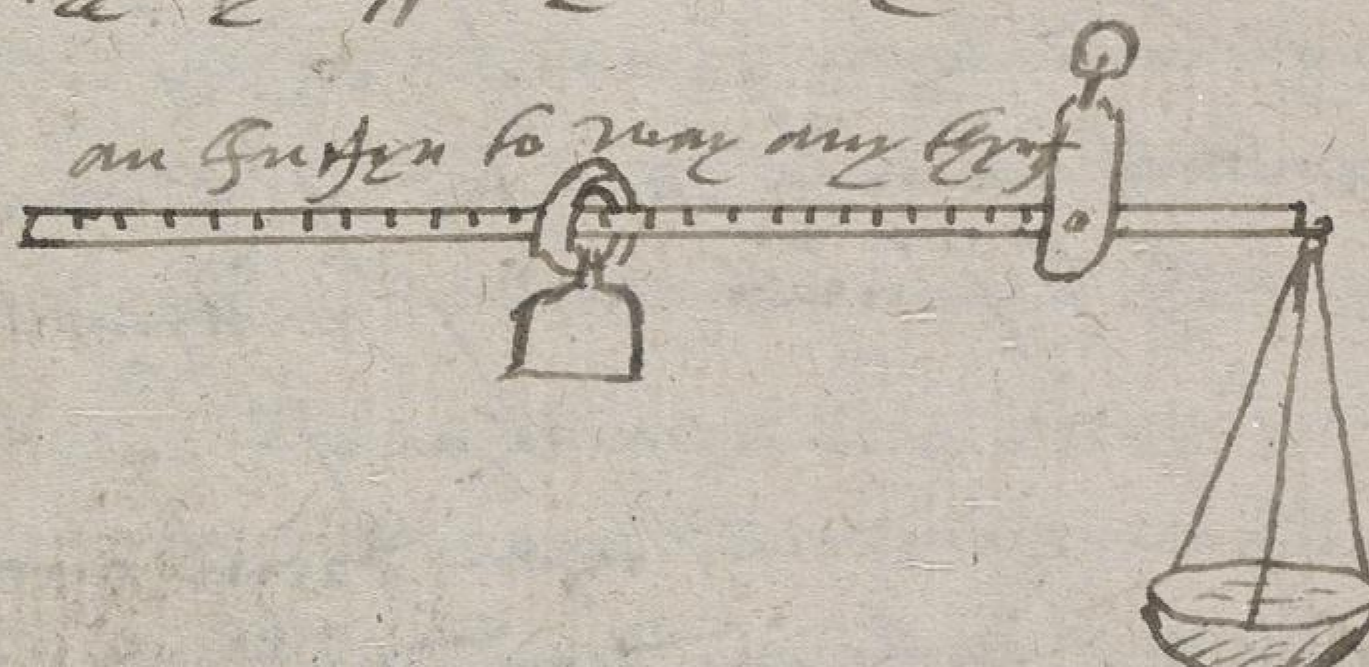
more for to lade a peace wth a cartredge ^than ther
is these Inconveniences in ye doynge ther of all
thoff ther is as much wayght in powder in ye
cartredge as ther is in the too ladelles of powder
yett the shott will nott doo yt execution as yt
woolde doo yff yt it wars loden wth a ladell in ther
vent yt ffly so farre for yt ye puttynge vp of ye powder wth
ye rammer ther doth verry much afood and ye wading
as touchinge ye dryfft of ye shott in ther will ye
peace bee so easyly pryned yt is charged wth a cartredge
as yt wold do yff yt ware charged wth a ladell &c
furthermore yff yt ye peace hane any hony combs
myt that may chance to stay or lett ye cartredge
in suche sort yt you shall skant gett ye cartredge
hom vnto ye bottom of ye peace for yff by chance yt
the cartredge shold dooble or theck or goe awry
by the way then you shold hane cleare much effor
to doe to drive yt hom vnto ye bottom of the peace
wherby in ye tym of service ther myght happen greate
Inconvenyence to be. soo concluded &c wherfore I will
shewe vnto you how yt you shall make an Ingyne
yt you ~~that~~ ^bee call a charge yt shall lade ^a peace at one
tyme and done as sone as you shall doe yt wth a

cartrege and shall ram vp ye powder all at one
tyme yt more closse then ye ladell shall wth owght
ye tornynge of ye ladell or of ye rammer hed and shall
kepe ye powder more closser then ye ladell shall and
ye makynge thereof foloweth as thes fyrst take
a ladell hed suche a one as ye ordenary laddelle hath
and then take ye platt suche plate as you do make
all ladells but that you must have more platt
then ye ladell hath and then when yt you wold
make thes ingyne or charg for any pece then
then bend ye platte round yt ye too edges tuche yt
yt may goe easylye into the mowthe of ye peace
then make yt fast vnto ye ladell hed yt ys
fytte for the pece and lett ye platt of the charge
be of suche lenght yt yt may holde so much powder
as is soffyshent to lade ye pece and then ye holle
yt is in ye charge hed lett yt be mad wyder then
the ordenary laddell holes yt yt may have a staffe
goe easyllye thorow yt to ye intent yt you may drawe
yt in and owght at your plesure and then fytinge
yt wth a staffe then put vpon yt staffes ende
a rammer hed made of purpose yt may goe fytte
and closse in and owght thorow ye platt of the

charge easyly and then lett ther be an other
smayll staff made fast unto ye charged and
then yt is fynysshed and then when so ever that
you list to lade a pece wth that charg do this
first dra in ye rammer hed close unto the bottom
of the charge and then fille ye charg wth powder
and then putt yt in to ye mouthe of ye pece holl
dyng yt by both ye staves and so puttyng yt unto
ye bottom of ye pece and then thrust in the rammer
hed staff wth on hand and then draw back ye
charg staf wth ye other hand and so drawyng back
ye platte of ye charge ye rammer hed thrusteth owt
all the powder and so ye rammer hed doth putt up
ye powder clos in ye pece and will lade ye pece
cleane wthowght ye spyllyng of any powder &
doth mack but one work for all which in
my opynyon is very necessary to be used in ye
tyme of service and is lest work then to doo yt
wth a ladell and yff yt your powder be in carterages
you may ether putt in ye carterege in to the
charge or elles you may empty it into ye charg
at your descrytion / &c



thes be ffor ye wayt below



The 57 devis

And furthermore as touchinge ye makinge of an
Ingion or Instrument which is very necessary
for gonners to have to sitt every year with the
trew wayght of powder and especially ~~the pounds~~
for to way ye cartriges yt is filled with powder and
is less trobellsom then to have a payre of ballans
wether shall be vse to have so many wayghtes
for ye one wayght of halfe a pound or a pound shall
be abell to way 50 or 60 pound which kind of
thinges ar all together vsed in sowthe spayne to

way all kynd of marchaundis which they do take

and yt is this made first prepare on stalke

and then lett it be strenghed as a stall or ordenary

ballans is with a hoke at ye end of the strynges

and then make a beame of Iron or wood a bowghte

3 quarters of a yard longe more or less at your dis

cretion and then with in a 2 Inches of one of ye

endes lett yt have a pinne theare and a clave or

such a thinge as allowther balans hath to holde

yt up by yt ye pinne may goe thorro and to be plyant

to goe to and from haven as all other ballans hath

and then to have one wayght and yt to hav a ryng

and then when yt you would way any thing then

putt ye rynge upon ye longer part of the beame

and the beame to be marked with notches and

at such a notch the ryng of ye wayght beyng ther

yt will way one pound and at a nother notch /2/ pound

and at a nother /3/ pound and so forth unto /40/ or /50

pound which is a very nessissary thing for yous

to have to way ther thinges withall and ys but

of smaull charges the sertayn thereof ys bessides

The 58 devis of martiall affares as

touchynge fortes & townes

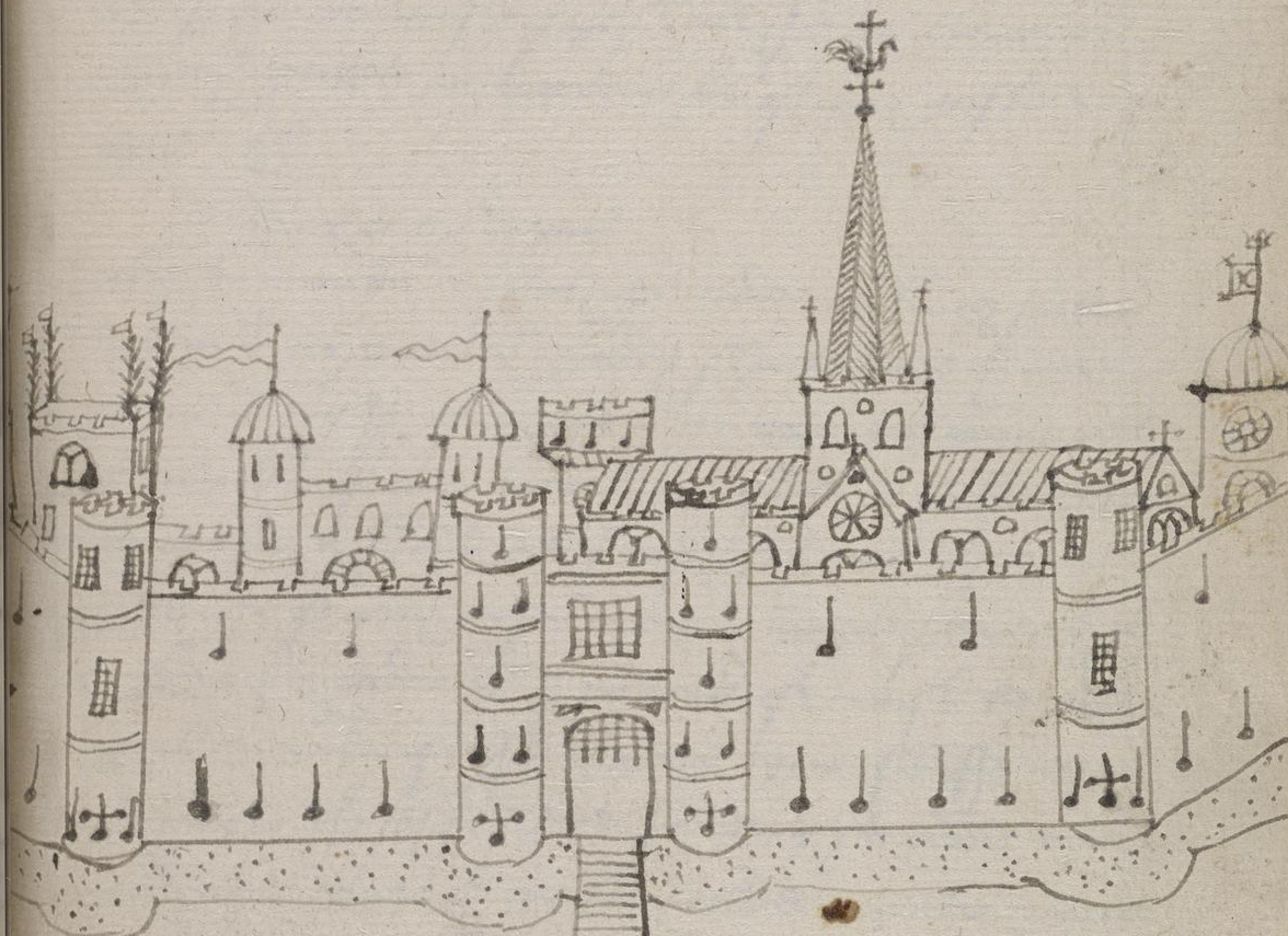
As tochynge this here for to order theason ye walle ✗

off any towne or forte or castell yt may be thus done
wth owght ordynans so that yt be nott watered or
bought it/ as thus ~~catch~~ cartayn great tymber and
under shore or proppe the wall in dyvers places
and that doone then dyge or undermynd the wall all
alongst the wallsyde as longe as you do thynke
yt sofficient for your purposs and so undermynd
yt alongest untell you be more and halfway
under the fondation off the wall and then make
fyeres unto every one off the shores or proppes
and burne them a sonder and then as sone as the
walle doth mysse the shore or proppe and the fondation
off that syde dygged away the wall must neads fall
presently &c and by thes meanes off fyere they may
burne the portcolleses or gates off any castell or
fort yff that ther be nott off Irone

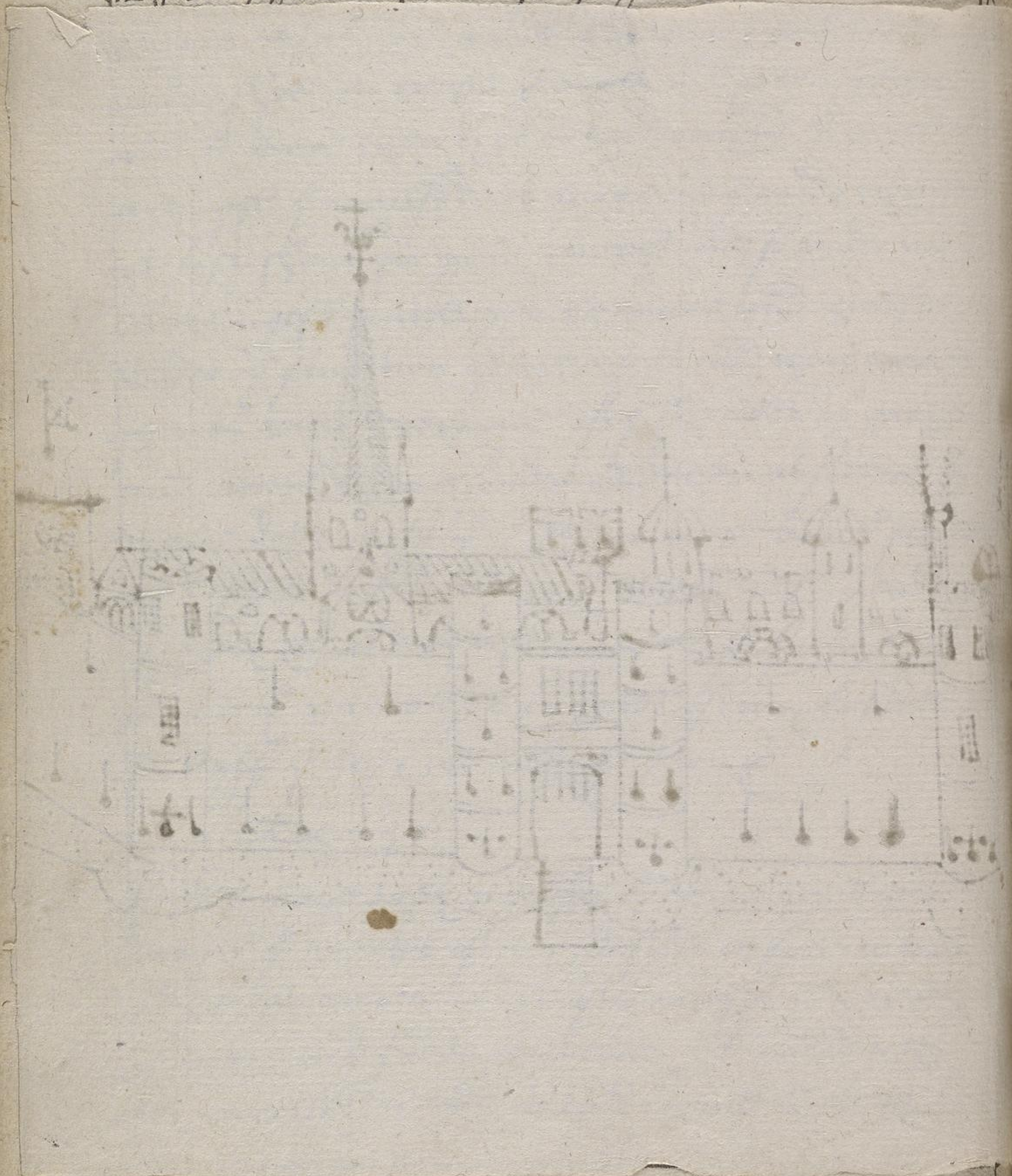
The 59

Further more they may in lyke maner breake
downe the walles off any castell or forte or towne
wth great rammes mayde off purposse wth great heddes
off Iron and stelle some may be mayde to hange
in provission and to be drawne back by the

strengthe of man and so by violence to come agaynst
ye walles of a towne and owtewr them maye be mad



off any towne or forte or Castell yt may be thus don
wth owt ordynans so yt yt be nott watered or



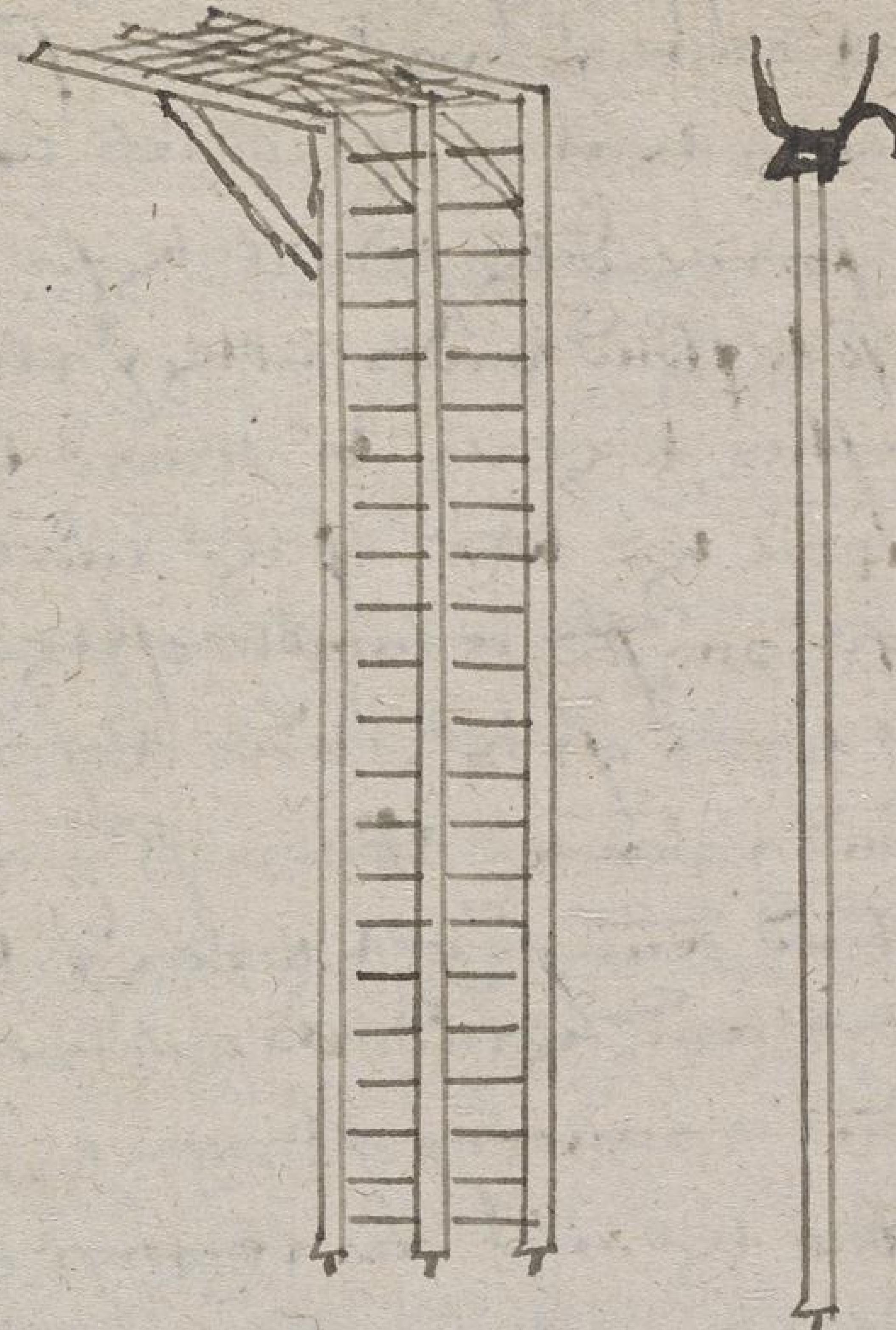
strength of man and so by violence to ronne agaynst
ye walles of a towne and owther som may be mad
to ronne one wheles and to be ron wt ye violence
of a nomber of men agaynst ye walles and so
breake them downe and allso theis kyndes of
provision is most specially to breake
downe ye gattes or portcolesses of any castell or
towne &c

The 60 devyce

Howe to make a scalynge ladder in such sorte
yt them yt ar upon ye ladder shall have ye advan
tage in ye fyght of them yt ar upon the rampyer
of ye walles of any towne or castell or fortresses
yt it be for to stand at ye pushe of ye pyke or the
handlynge of any other wepon what sever yt it
be and this ladder yt I speake of must be mad
in this maner fyrst prepare yowr staffe ac-
cordyngly of sofficient strength and then
accordynge unto ye accostomabell maner make
a dobell ladder of 3 peaces of tymber and
stave it accordyngely as of costom that hath
byn used before tyme / and then ye peece of
ye place beynge taken yt is to be scalled for

to ~~mark~~ ye lenght of the ladder then mark ye
lenght of ye ladder accordingly yt yt may stand
or rest wth in a foot or 2 or 3 of ye hight of ye
topp of ye wall and then for ye topp of ye ladder
then cutt 3 peeces of smayll tymber of 6 foott
longe and then lett them be mad fast by
some meanes at the upper eand of ye ladder yt
it may stand lyke a platform upon ye topp
of the ladder to ye wall wardes / and then lett
there be 3 braces stonde or mad fast underneth
ye platfrom upon ye topp of ye ladder to bere the
platform from the 3 ladder staves unto ye 3 peeces
of ye platfrome one the topp of the ladder / and
then to yt purpose yt men may be abell to stand
upon ye platfrome upon ye topp of ye ladder there
may be ~~[illegible]~~ certayne fflyhtes of light bordes
yt are stronge suche as are used to be mad for ye
standes or gratyng of sheps yt may lye so close
togyther yt a mans foott cannott goo thorow / and
then at the lower eand of the ladder to have
pickes upon ye 3 peeces of ~~the~~ tymber yt ye ladder
do nott slype when yt yt is sett unto ye wall and

then ye lader ys ffynysshed and then to rayse ye
lader to sett yt unto ye wall they must make a
forcke of tymber that must be as longe as the
lader and yt forcke doth serve both for to rayse ye
lader and allso to stond under note ye plat forme of
ye lader to be a stay to helpe to beare the wayght
of ye men upon the toppe of the lader &c / and this
laders beynge raysed a number of them they may
stand one the toppes of the lader as fermilye as
them yt do stond upon the rander of ye wall / and 6
men may stond and fyght upon ye toppe of every
one of ye laders and handell his weapon for
ther may stond 3 ranckes of men upon ye platt
forme besydes them yt are comynge up the lader
and this lader is 20 tymes better then ye other
kyndes of laders in all respectes / yff ye
other playne laders be to longe then they yt doth
defend may by force put them over and yff yt ye lader be
to short but one foott yt wilbe so paynfull unto
them yt shall ryse to recover ye wall yt one man
may kepe downe 10 men but in this kynde off
lader yff yt yt be 3 or 4 or 5 fotte to short yett they
may stond and fyght and one helpe another over
beynge armed men they may go over wth ~~wth~~ ease



The 61 devise hipotheciodie

yf any towne or fort be settwated in a dry grownd
where yt ther be sobiect unto underminynge then
then to avoyd ye danger therof they may do this lett
them fyrst make a vent downe in som place wth in
ye towne and so dyge deap under ye fondation of ye ~~towne~~ walle
and allso under ye towne dyche and then when yt
they have dyged throwght ye dyche then lett them
dyge all alongest by ye towne dyche as farre under
ye grownd as they may conveniently and make

away round a bowght ye towne under nethe the
grownd wth owght syde of the towne and ye soylle
yt they dygg owght in ye dyggyng of yt they may
dampen ther walls wth that stooff and then when
so ever yt they ar bestayed and doo dowght under
myndynge then they may marke fforthe every day
in the same place &c so yt is nott possyble for them
to under mynd butt yt they shall here them and
perceyve wher yt they be and allso yt place wilbe
a toll unto them and then you may use a gaynst
them what ~~you~~ pollysye yt you lest to anoy
them at your plesure and prevent them of ther
purpose &c

The 62 device hipotheiodie

As towchinge this for to know whether yt there *
be any under myndinge in the grownd and wher
yt they be it is thus knowen take a latyne bason &c
go unto ye place yt you do suspect yt under mynders
may be and sett ye bason upon the grownd and
then put a 5 or 6 peasone in to the basen and yf
that ther be any under mynders near hand then
at every stroke yt them yt are in ye grownd dothe
wth ther tolles ye peaste will make a jarre in ye
basinne and allso ye effect will ye move a pen

yff y^t you do bynd a sackfull of wooll as harde
as you canne then settynge y^e basen w^th peasse
upon y^t you shall heare every stroke y^t is made
in the grounde and this is one of y^e best thinge
y^t may be ~~made~~ devysed to be plased in any
place for to knowe wher y^t undermynders be (as
in y^e devise goynge beffore to plase yt in y^e patte
under the grounde (or allso where y^t there ys no
such way under the grounde yett they may make
dyvers ventes or deape holles in y^e grounde and this
thynge placed there they shall heare every stroke
y^t y^e undermynders doth stryke &c

The 63 devise hipotheeodie

As touchynge this howe for to make a cave to
the intente to place powder to geve fyer to blow
upe any fort or bullwarke or the walle of any
towne yt is this to be done when y^t you do begyne
for to dygge to make your vent into the grounde
lett yt be of some dystance from the place that
you doe meane to blowe upe and then when y^t
you are entred into y^e grounde then do ~~then~~ nott dyg
ryght towardes y^e place but indente yt some tymes
one way and somtymes an nother way y^t the

way be nott strayght to this hand yt you maye
fortyfye ye vent off ye way so stronglye yt yt may
be able to resyst ye fors off ye blast off ye powder
and ye ventte off ye way to be as neer as may be
neare unto ye plac or vallt yt ye powder ys placed
and in lyke maner to dygge as deape as you may
into ye ground and so when yt you have dyggede
neare untill yt you doe come unto ye plac yt you do
meane to blowe up then you may dygge som what
neare up wardes yt you doe nott plac ye powder
to deape under ye ground but at a resonable dystance
and then in ye rome yt youe doo plac ye powder in
theare lett yt be wrought over ye powder a vallte
off 7/8/or 9 foott hyer then ye barrelle off powder
to this intentte ye yt myght take his vente up
wardes for ye ayere yt ys in yt holowe plac wille
be ye ocation off ye lyfftenynge or rasynge or rentynge
off ye ground ryght over yt and then when yt you
have plased ye powder in ye vallte yt is soffycyentt off powder
for too serve your turne and ye more in quantitee
ye greater shall be ye effecte off ye rasynge off ye
thynge then before yt youe doe ram up or mack
up ye ventt off ye way you most mack your pro

provisshone for ye place to gyve fyere unto wherof
yt beste to be done by makynge a tronke in
boordes made & sawen of purposse to be of ~~longthe~~ lengthe
from ye mowthe off ye entrance unto ye vatte yt the
powder dothe stond in & yt moost be plased or
layed all a longest yt yt may be close and the
provisshone putt in to yt yt must gyve fyer unto
ye powder in ye vatt and then ramm uppe ye way
that was made unto ye vatt yt ye powder stondeth
bothe wth earthe and stronge tymber &c and yt
tronck of boordes shalle keepe ye provisshon of
ye trayne wth owght any spyll or moyster to hurte
yt and you may make your provisshon so yt you may
chewse whether yt youe wyll gyve fyer by a trayne
wth a mache lyenge all alongest in yt made off
purposs boylled in certayne myxtures rowled in
serpentyne powder or elle by a smalle lyne to goe
wth a pully all a longest the tronck or case and
ye lyne to pas thorrow a greatt quantety of powder
in ye vatte where ye powder stondeth and then when
yt you would gyve fyer unto ye powder then to make ye
fyer fast unto ye lyne and so to drawe ye fyer unto
unto ye powder unto yt by a lyne &c

The 64 docum hipothorodie

As tochinge this howe for to digge away in the
grownd to come ryght under any place assygned
ye waye beynge crooked undentinge sometymes one way
& an other tyme an other
way as yt ~~yt~~ may nott be made straight
yt is somwhatt dyffycolt and askethe a good con
sideration in ye doinge therof / for yff yt ye powder
be nott placed ryght under yt thinge yt is ment
to be blowne upp then ye thinge shoulde be off
lytell effect / wherfore in ye orderinge off the
way off a myne to com ryght under ~~any place~~
any place assygned yt must be this handeled
first the must knowe ye trew distance unto
the place yt is ment to be blowne upp from
ye place yt you doe begynne for to digge or enter
in to the grownd and yt beinge knowen then
then looke presyslye whiche way yt ye place
doth beare and then drawe or make a platt
of the same wth a scalle or tronte of mesure
there unto apartayninge and then accordinge
unto ye distance from ye enterance unto ye place
assygned drawe brought how many foott or yardes
yt you will goe first one ye one syde and then

and the other syde in ventynge ye way in the
grounde and nott to goe ryght upon ye place
assygned and so by yt meanes knowynge what
quantetye of measure you have you fyrst one
way and then another way in the grounde and
by whatt proportion in the way both by ther
derectione of ye way and ye quantitie of measure
in the way you may goe derectly unto ye place
assygned in the grounde and you may marke your
platt fyrmelye how yt you will do yt before yt
you doe enter into ye grounde acordynge unto the
dystance of the places assygned and allso yt may
happen so yt when yt you are an undermyndynge
in the grounde and have purposed to goe so many
foott one way and so many foott an other way
and yt you have made your platte so and yett ther
may bee such Impedimentes or lettes in the grownd
yt you cannott do yt acordynge unto your fyrste
meanynge and then you may mende yt and al
teryt in your plat acordynge unto ye way yt you
may goe and so to com unto the trew plat assygned
and so you may alter your platt acordyng unto the

plac yt youe may goe untell yt you do atayne
to come unto ye plac asygned to make ye watte
in the grounde to place ye [illegible] powder in yt &c

The 65 doon

Yff yt garyson so yt those yt hath beseged a
towne and yt they doo contynewe to batter both
nyght and day so yt they can nott make up ther
breach in ye nyght then the best way is for to
make yt plac deffensible in this manner lett
them cast a dyche or trenche within on the insyd
of the wall allalongest ye breach ryght agaynst
yt of a soffycyent depth and of wydnes to be
defendable and then lett them plac ther
ordynance agaynst ye breach and allso flanckers
in suche manner to scower ye dych within on ye
insyd of ye wall &c

The 66 doon

I doe nott thynke yt you meatt to be spoken
of this for to knowe yff any dych or trenche be
cast yt yff ye dych be mad so many foott brode
in the brymme and so many foott brode in the
bottom and so many foott deape yt yff you woolde
have a wall or rampere made of ye stoffe yff

you woold have it so many ffoott brode in ye bottom
and so many foott brod on the topp then to knowe
justly howe many footte hye yt ye wall will be
off that stoff which is heaved owght off the dyche
when yt ye earth is setteled or ells for to knowe yff
yt you woold have ye wall mayd so hye then for to
knowe whatt thyckenes yt it wold beare beyng mad
off that stoffe which is heaved owght off the dyche
for to knowe yt dow this / fyrst accordyng unto the
wydnes off the dyche in ye brym and in the botom putt
both the numbers to gether and that done then take
halfe that nomber and then accordynge unto ye depnes
yt you meane to make ye dyche then molltyply them too
nombers to gether yt is to say ye nomber off feett off ye
depthe off the dyche and ye bredthe thereoff att the brym
and ye bottom beynge added both to gether halfe that
nomber then yff you woold knowe how hyghe yt it
wolde make ye wall at suche a thyckenes at ye botom
and ye topp then adde those 2 nombers both to gether
and take halfe yt and devyde yt owght off ye nomber
off the dyche so molltyplyed and that nomber that
standeth in ye quantytie hyme shall be ye hyghe off
the wall / and fardder more yff yt you woold have

the wall so many foott hye and woold know howe
many foott thereof yt it woold be off yt stoff then devide
ye heyth owght off ye nomber off ye nomber off ye dyche so
molltyplied and yt wyche stondeth in the quantytee
hyre shallbe ye thycknes off the wall in ye myddell &
then you knowyng yt you may use ye thycknes off ye
bottom and the toppe at your dyscrecyon & be cause for
the better understandyng off the matter you shall have
this insamppelle by a dyche yt I woold have mad off
20 foott brode at the brymme & 12 foott brode in the
bottom and 10 foott deppe and I woold have a wall
made off that stoff to be 16 foott at ye bottom off the wall
and 8 foott at the toppe off ye wall now my desyer
ys to know how many foott hye yt yt wolde be off
that stoffe yt cometh owght off ye aforsayd dyche when
the wall ys settled and dryed you shall knowe yt
thus fyrst adde ye wydnes off the brymme and the bottom
off the dyche bothe togyther and yt ys 20 foott for the brym
& 12 foott ~~[illegible]~~ for the bottom and thes to nombers togyther
maketh 32 foott then take halffe yt nomber &
yt ys 16 ~~16~~ and then ye deppnes off the dyche beyng 10 foott
then ye molltyply them tow nombers togyther yt ys to
say 16 tymes 10 and yt maketh 160 and now I wold
have ye wall 26 foott brood at botton and 8 footte

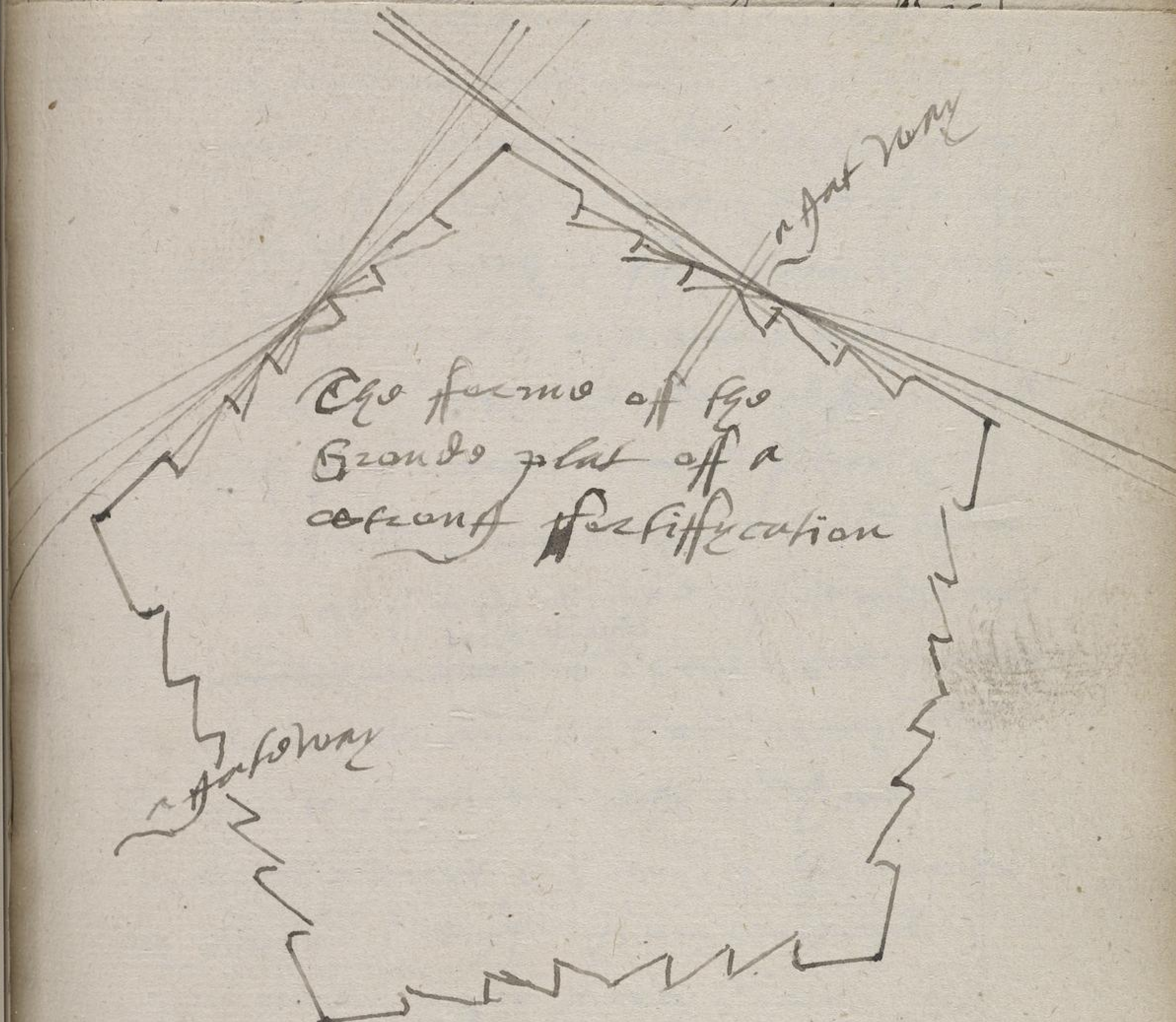
att the toppe and these to nombers added togyther
makethe 24 and halfe yt ys 12 foott and now my
desyerr ys to know how many foott yt the wall will
be hye and and to knowe yt doo thes devyde ye 160
by 12 which ys ye thecknes of ye wall in ye myddell
and that nomber yt standethe in ye quantyte commi
ys the hyth of ye wall and yt comethe unto 13 foott
and 4 Inches Just so yt you may conceve yt a dyche
beyinge ~~cast~~ yt ys 20 foott at ye brym and 12 foott
in ye bottom and 10 ffoot deape will make a wall of 16
foott at the bottom and 8 foott on the toppe and 13 foott
and 1/3 in hyght sixe and furthermore by ye ensample
of that dyche and I wold haue ye wall 15 foott hye
my desyer ys to knowe how thecke yt ye wall wold
be of that stoffe then devyd ye afforsayd nomber
of 160 by 15 and then ther will stand in ye quantyte
commi 10 and 10 will remayne over so that you may
conclude yt ye wall of ~~16~~ 15 foott hye will be 10 foott
theck and 8 Inches and then you may at your discretion
you may make yt of whatt bredthe in ye bottom that
you lyst and look what yt you doe brode it in
the bottom yt will lack yt brethe at the toppe ...

therfore yff yt you doe make yt 15 foott at the bottom
yt will be butt 6 foott and 8 inches at the topp &c

The 67 down

As touching ye intrenching ether off any army or
the inclosynge off a towne they must observe this
order yt they may flanck ye cortyne off ye trenches &
in more places yt they may flanck ye more stronger
is ye places so intrenched and allso most speciallye
to flanck ye corners or collione poyntes and allso ye
wayes or towne gates where that there is ventes for
peopell to pass in and owghtes and allso that order
is to be observed in ye buildynge off any fortyffication
as the walles off cities or townes or fortes or castells
for yff yt yt be so yt they can nott flanck ye sides off the
walls ye thinge can nott be off no force as com
monly all those castells and forte yt war builded in
the tyme off kyng henry ye 8 war rowndes or partes
off rowndes which ar off no force for that they can nott
flanck ye dyches &c wherfore I do thynck it good
for to shew whatt maner off cortone off a wall is ye best
kynde off fortyffication and then you may make thes
number off corners or colyandes poyntes wth ye cortynes
off ye walles accordyng unto ye quantity or bygnes off

Roott thes of and yt will shew unto you the trew
lenght from ye one cornes unto the other as for



The 69 dicon

ye circle rounde or sortt at youre descretion as nede
doth requyre as 4 square or 5 square or 6

in them selues and yt done adde both of youre nombers
togyther and that done then extracte the square

foott thereof and yt will shew unto you the trew
length from ye one corner unto the other as for
Insample this there is a rampier of earth off 15
foott high by a plome lyne and ye foott or bottom
of yt is 5 foott further owght then ye toppe is nowe
my desyer is to knowe howe many foott yt ladder
shold be yt shold reach Justly from the foott
unto the bottom to be sett close unto ye wall both
at the foott and ye toppe then doo this first mult
typly ye heyth off ye rampier or wall of earth as
this 15 tymes 15 and yt maketh 225 and then
ye lenynge in at ye toppe beinge 5 foott and 5 ~~foott~~
tymes 5 ~~and then 225 and~~ maketh 25 then putt yt nomber
unto ye other nomber and 225 and 25 maketh
250 and then to extract ye roote and yt wilbe 16
foott lackinge 2 Inches &c and by this meanes
you may knowe ye length off any thinge from
corner unto corner whatt so ever yt yt be ~~[illegible]~~ as I
do more at large declare in the ~~chapter of the~~
thirde part off my booke called the tresur for
travelers

The 69 devis

And furder more yff yt you doo knowe the lenght of
any tryangle from corner unto corner and do but
knowe the lenght of one of ye sydes you may knowe
the lenght of ye other syde as this whether yt yt
be the rampere of a wall or a lyne strechede from
the brym of a dyche unto ye toppe of a wall that
beynge knowen and other what ye hythe is or
what yt lengthe from you yf you may com by
the mesure of 2 sydes you may knowe the thyrde
how so ever yt yt be and yt ys knowen this fyrst
multyplye the lenght of ye slope lyne yt is to say
from corner unto corner squarly yt beynge knowen
then multyplye the other knowen syde squarly
in lyke maner and then drawe or subtra that
nomber from the byger nomber and ye nomber
which remaneth extract the root therof &c
that will show unto you the lenght of ye other
unknowen syde &c as for ensample this by ye
rampher or wall of earthe of 12 foott from the
foott unto the toppe as yt was lenyng from
me wardes upon the syde and the foott therof
was 6 ffoott furthere ought then the toppe and

my desier is to knowe the trew hyth of the
wall or rampier howe many foott yt it is from
the grounde unto the toppe in the myddelle
theros the toppe ~~the toppe~~ theros to be flatt
then doe this thus beynge 12 foott and 12 ~~foott~~
tymes 12 ys 144 and the toppe doth leane
6 foott frounde me wardes and 6 tymes 6 ys
36 and yt nomber beynge drawn from 144
ther remayneth 108 and then extractynge ye
square Roott of yt nomber and yt ys 10 and $\frac{2}{5}$
so yt you may conclewde ye wall to be 10
foott hye and neer 5 Inches &c /and by this
order you may knowe ye length of any slope
lynne as I doe finde shewe you in my book
called the tresur for travelers &c ///

The 70 devis

As tochinge this I do nott thinke it commodate
to be spoken of howe for to shadowe men on
a platt forme wher they ar unprovided off
bascottes as yt may happen in dyvers places
one a platforme by ye sea syde or one a platform

one the toppe off the wall off any towne or in
suche other like places where it happeneth
to be any [illegible] and the sedayne where as
greatt ordenance ys planted and yf for the
openings or the bayndes of the place yf they have
no thinge to shadow them butt them smalle
shott doth or may beatt them from ther orde
nance then to prevent that this ys the remedye
for to prepare canvase and to sett upp stanchens
all alongest and so to shadow ther men with the
canvase and then when that the peases be loden
then with a pece of a lyne to draw up the nether
edge of the canvase and so to levell the peace
and shoott yt of under the canvase and so
by that meanes the enemye shall see no marke to
shoott at for otherwise they wilbe shootynge
at the place wher as they do see any number of
men togyther but yff that they doe nott see to
whatt place that men do assembell togyther they
can nott tell wher for to shoott with ther smalle
shott and allso I doe nott thinke this devise not
fruitfull to be used upon the toppes of the walls
of a towne wher as men have any greatt

error and allso yff yt any mane lyst to loke
towardes ye enemyes he may but put up the cloth
and se better then they may doo owght at any
loupes for ye will allwayes wayght wth the
smayll shott to se yff yt ther be any peryng
owght at ye loupes to shott at them &c
se the 71 leve

As tochinge this how for to know of any thinge
donne or to ~~be~~ be donne speedylye and in ye shortyst
tyme som have devysed to doo yt by one meanes
and some by an other meanes as this by the
preparinge of stationed swyfft horses beinge
layed in dyvers places at the end of every 8
or 10 myles to the end to have fresh horses
which is ye best way and other some have devysed
to do yt by traynyng up of a dogge to you betwene too
plasses and then the dogge beinge beten frome
the one place woll come unto the other place
derectly and then when yf ~~you~~ they wold have
any letters sent speddyly then they had made
provyshon to hang them a bowght the dogges
neck &c and a dogge will come a greatt way
in a lyttell tyme yff he had reson and dyd un
derstand whatt he was willed for to doo butt

the swyftest way is to be donne by ye meanes
wiche ye romanes tawght the Englyshe Britt
taynes when they ~~taw~~ shed them to make a
wall to defend them selves agaynst the pyctes
which was by certaynne trunckes made off
brass layed in the wall and at the ende
off every 2 or 3 mylle they had a gatt which
was both watched and warded and so by the
meanes when so ever yt they had any ocation
to geve any warnyng unto them yt sholde
defende ye stand pyctes then ~~coulde~~ unto what
place yt ye pyctes did ~~make~~ any asalte unto
then they ware satysfied thorowe ye sayd trunk[es]
off brase where yt they ware and what hurt they
had done and what number yt ye ware off them
&c and by this meanes they wold gan warde
what was donne and what was to be donne
20 or 30 myles in one hower space throwghe
fore in my oppinyon this is a very good devise
for to be used in the walls off any towne off
warr to be layed all alongest ye walls off ye
towne from ye on gatt to the other gatt wherby

yt there myght be warnynge geven from any one
place unto an other upon the sodayne &c

The 72 devise

As towchinge this howe to conwey letters secretly
and nott to be found and knowen where as there is so
grett a wayght layed and grett serche mad upon
every parson yt doth passe to and from for letters
you may doo this you havinge some dogg or some
bade spanyell yt will nott be kept from you
and som doges will nott com unto them to be taken
up prepare a coller for hime yt may be hollow
wth in and nott to be a coler to look unto to be
worth nothinge and in that coller you maye
conway your letters wthowght any suspition
for the man may be serched and yett the dogg
will follow his master romyng to and from
and no parson can tell whos dogg it is and
well as some tack the doge to be some of there
oune companyes as otherwyse &c //

The 73 devise

An other way to conway letters secrettly yt ys to. *
make up thi letters and rowll them uppe rounde
together and then they may cause some kind

of boxes to be mayd of mettall wth a clos scrwe
to be rownde and longe so yt yt may goe into the
mowthe of a bottell and then ye letters beynge putt
in to yt small box and ye box scrwed and mayd
close yt no lycor cane soke in to yt then putt yt
boxes in to the bottell and then you may fill it
wth wyne or suche other lycor and send yt by
any persone yt you wold have them com unto
and yt will nott lyghtly be suspected &c

The 74 devise

* And furthermore yf that you have any grett quantitie
of letters or bookes yt you wold convay secretlye
and wold nott nether lose them nor have them
founde nor knowen and there is a waye sett layd
for ~~[illegible]~~ thinges then doe this ffirst prepare a
rondlett or smalle barrell yt will be mayd thycke
of sofficient bignes to holde these letters or bookes
and then laye them in a ~~[illegible]~~ seare clothe and then
take of the hed of it and putt them in to the small
barrell and then putt in ye hede of it agayn and
hope it wyth clothe agayne and make it thycke yt
no lycor may com in to it and then ~~take~~ a

greatt caske as a butte or a pype or a hogeshed
at your dyscretione and then take owght ye hede
of yt and then putt in ye small barrell wth letters
and so putt in ye hed of the grette caske agayne
and so make it thyght agayne and then you may
fille yt cask wth wyne or wth whatt so euer
you lyst hav / and then yt cask or pype of wyne
beynge amongest others yt may be transported
from place to place at your dyscretion and never
to be knowen what is in it no other wyse then
the other cask and it may be tasted at any of
ye heddes or sydes in every place as ye other vessels
or in all poyntes and there shall be nothing seene
nor knowen and allso yt is very good for you to
have the lytell barrell in a peece of course wollen
cloth and then it will ^not^ knock in ye vessell to be
hard in ye removynge of it to and from and then
you may transport it other by watter or by land
and it never be so perceaved //

The 15th devise

And furder more ther may be such meanes mad *
yt you may knowe the mynd of your frendes
allthoff yt you may nott com at them nor
send unto them by the form of sartayne lyghtes

in the nyght as this you havinge consulted or
or talked to gether yt yf they do show you so many
lyghtes and standynge alone suche a fasshion or from
yt is sygnyfieth such a thinge is done by the
enemye or elles yt you must do somthinge and in
such a forme yt it sygnyfieth such a thyng &c
accordyngly unto ye talke yt you have agreed
upon &c and furthermore you may devise by ye
forme ^of lyghtes ~~in the nyght~~ ~~wryght a letter~~ in ye nyght to cause
your frendes to wryght a letter by and so by
that meanes to declare your holl mynd unto
your frendes ~~that~~ this you havinge agreed upon
them yt yf ye there be so many lyghte and stand
after suche a ffassion yt it sygnyfieth to wryt
A and yf so many lyghtes and in such a forme
them to writt B and so forth unto you the
nombers of letters accordynge unto the forme
and nomber of the lyght so shewed and then
at the ende of every worde so writen to show
but one lyght for a stoppe for ye ende of a word
&c/ untill yt you have fynysshed and further more
in lyke maner by lyghtes in ye nyght is ye most
speadiest thyng to have any thyng knowen yt
may be to geve warnynge unto any contrary

to be in a readines vpon ye sodayne as we haue
in Inglande doe prepare for ye west therof by ye
fyrynge of ye beakens &c and furthermore
it is vsed vnto a further practise vnder nethe
ye kynge of spaynes dominions vpon the sothe
coste called andelusia with in ye straytes of
Gibralltare ye sea beynge called mare mediterraneum
as there is smalle towers all alongest ye cost
yt they do kepe wach in and at ye ende of euery
leage or in lesse dystance there is one of these
small towers and yt is so ordeyned amongst
them yt they can tell whether yt any of theis
torkes or mores galeys hath byne on ye cost
and what nomber of galeys yt there be of
them and whether yt they haue landed or byne
a shore and whether yt they be gone ordenary
still by ye very forme of ye nombers of ye lyghtes
yt ye one towre doth shew vnto the other and
by theis meanes of these lyghtes they will knowe
of thynges done 100 leages from them all alongest
the cost in one nyght for that ye one of ye towers
doth take of the other tower &c

The 76 of down marshall affares by lond

As touchinge martiall affares I have nott ben
any in greatt experyence therfore I am more bolld
then wyse for to say any thinge therof consideri(nge)
the greatt nomber of wyse and descrete and
valyent yentell men and soldyers yt hath byn
trayned upe of no smalle tyme in those affares
yt I beynge so symple and rude shold many
desyre it much the rather but yett nott wth stan-
dynge they may make the lesse acounte therof
and be nott envye the rude wryter therof for that
they be but wrytten but as slender devyses and
hyst this for to knowe what you have rered
any peace of grounde for to knowe how many
men yt yt will receave to stand in ther marc-
hynge forme accordynge unto tartalyas order
yt he describeth and nott accordynge as Nicolas
Macchyfells description to alowe for every man
3 foott in bredth and 7 foott in length but accor-
dyng unto the order of tartalia to alow for
every man 3 foott in bredthe and but 6 foot
in length wherfore I do thinke yt necessary

for to knowe how many men will stand in ther
marchinge forme vpon any grownd for to march
say furste and the end is this yff that you han viewed
the grownd and doe knowe the length and the
bredth therof then you may knowe how many
men that it will receive and by this meanes you doe
knowe whether that it be byge Inoff or to smalle
to serve your purposse &c / and the second poynte
is this by the meanes you may knowe vpon the vew of
any grownd how many men that ther be of your
enemyes yff that they be ether in ther battell forme
or in ther marchinge forme as they wilbe all
ways yff that they be ioyned except that it be for
polysy sake as yff that they wold shew them selves
to be fewer in number then they are then they
will goe closser togyther then they do of custom
and yff that they wold shewe them selves to be
more in number then they are then they will
goe wyder asonder then of custom &c and for
to knowe how many men will stand vpon any
peace of grownd doe this first when that you
doe knowe the length of and the bredth of any peace
of grownd howe many foott that it is then

multyply them to unto gether yt is to say ye nomber
of featt of ye length wth ye nomber of featt of the
bredthe and then looke what yt nomber cometh
unto and then devid yt nomber by 18 and that
will show unto you the trew nomber of men yt
will stand in ther marchinge forme accordinge
unto tartalias order yt is to say to alow every
man 3 foott in bredthe and 6 foott in length a
and now accordinge unto ower Inglish mesure
yt is to say to knowe how many men will
stand upon an aker of ground as an aker off
ground doth contayne of ower land mesure 160
rodds or poles of 16 foott and a halfe in length
and yt will make in square mesure 208 foott and
8 inches and better every ~~one~~ way square so yt
ther will stand upon one acker of ground in
ther marchinge forme alowinge unto every man
3 foott in length and 6 foott in bredth 2420
men and after yt ratte you may knowe how
many men will stand in any pease of ground
how bige or smalle so ever ~~it~~ the ground
be as a quarter of an acker will resceve
605 men so yt less then 7 rodds of ground
will resceve 100 men &c

The 77 order Stratarithmetrie

And furthermore I do thinke yt convenient for
to show how many rankes off men will be in
ye length off a myle wherby yt yff you do se
the length off men in the marchinge you may
gyve a very nere gess off ther nomber as thus
an Englyshe myle doth contayne 5000 foote
and then as before is declared to alow for every
ranke 6 foote wherfore devide ye 5000 foote by 6
and that will showe unto you how many
rankes off men will be in a myle in length
as it is 833 rankes so that you may consider
that ther will be 416 rankes in half a myle
and 208 rankes in ye length off a quarter off a
myle and in ye length 600 foote just 100 rankes
and that is less then $\frac{1}{8}$ part off a myle and then
you knowinge howe many men that ther is in
a ranke you may knowe ye nomber of men.

The 78 order

And furthermore I do thinke it convenient for to
show unto you howe for to sett a battell square yt is
to say for dyvers nomber off men and ye nomber off
men beinge knowen to have so many men ~~may~~ in a

aunswere ys ye nomber of rankes cometh unto
and fyrst for 100 ye square roott and so increasyng
by ye halfe hondreth unto 500 and ~~the~~ then increasyng
by ye 200 untill yt they be 2000 and then incre
syng by ye 1000 untill yt it be 40000 the first nom
ber ys ye nomber of men ye second ys the square
roott or battell and the third ys ye remaynder
yt will not be square &c

~~Here goyth~~ down the table followeth

~~And for that ye square roott or battell ys not~~
~~the strongest way for you to in battell your~~
~~self for yt ye frontte ys much narrower then~~
~~the syde or flanke of the battall wherfore in~~
~~myne opinion and also it ys ye opinion of dyvers~~
~~of them yt have written in martiall affayres~~
~~that the strongest way ys for to in battell hym~~
~~selfe ys to be square upon ye ground yt ys to say~~
~~yt ye syde of the battell and ye front of the battell~~
~~ys as many foott one way as it ys ye other way~~
~~and then ye nomber of men in ye frontt will be~~
~~dobbell unto ye nomber of ye rankes and so by yt~~
~~meanes there be the more men occupyed to fyght~~
~~all at one tym &c wherfor I do thinke it good~~

100	10	0	1800	42	36	21000	144	264
150	12	6	1900	43	51	22000	148	96
200	14	4	2000	44	64	23000	151	199
250	15	25	3000	54	84	24000	154	284
300	17	11	4000	63	31	25000	158	36
350	18	26	5000	70	100	26000	161	79
400	20	0	6000	77	71	27000	164	104
450	21	9	7000	83	111	28000	167	111
500	22	16	8000	89	79	29000	170	100
600	24	24	9000	94	164	30000	173	71
700	26	24	10000	100	0	31000	176	24
800	28	16	11000	104	184	32000	178	316
900	30	0	12000	109	119	33000	181	239
1000	31	39	13000	114	4	34000	184	144
1100	33	11	14000	118	76	35000	187	31
1200	34	44	15000	122	116	36000	189	279
1300	36	4	16000	126	62	37000	192	136
1400	37	31	17000	130	100	38000	194	304
1500	38	50	18000	134	44	39000	197	191
1600	40	0	19000	137	231	40000	200	0
1700	41	19	20000	141	119	50000	223	271
The nomber of men	The Square roote or batell	The Remaynder	The nomber of men	The Square roote or batell	The Remaynder	The nomber off men	The Square roote de batell	The Remaynder

the 79 daie

And for that the square ffootte or battell
is not the strongest way for you to Inbattell
youre selfs for that the frount is more
narrower then the syde or flancke of the
battell wherfore in myn opinion and
also yt is the opinion of dyvers of them
that hath written in marshall affayres
that the strongest way is for to in battell
hym selfs is to be square upon the grounde
that is to saye that the syde of the battell
is as many foote one way as it is the other
way and then the nomber of men in the
frount will be double unto the nomber
of the rankes and so by that meanes
there be the more men occupyed
to fyghte all at one tyme &c
wherfore I do thynke it good

to showe vnto you howe many men yt in a rancke
or in a fronte and allso howe many ranckes that
there wilbe in the side or flancke and allso in howe
many foott of grownd sqware every way yt they may
stand vpon accordingely as before rehersed
allowinge every man 3 foott in bredth and 6 foott
in length begyninge at 100 men and so incre
sing by the halfe hundrethes vntill yt they be
500 and then increasinge by the 1000 vntill
yt they be 40000 and the first nomber ~~of men~~
is the nomber of men and the second is the nomber
of men in a rancke for the frount and the third nomber
is the nomber of ranckes for the side or flancke
and the fourth nomber is the remayne that will nott
com in to be a holl rancke in the frount nether
will they be sofficyent to serve to make one the
more in a rancke / wherefore they ar to be imployed
accordinge vnto the will of the generall or the
captaynes of the leaders of those men & the
fifth nomber is the nomber of the feette that those
men may stand vpon in ther battell forme to be square
ont the grond that is to say to be so many foott every way / and
now followeth the table of the thinges before rehersed

the number of men	the number of men in a ranke	the number of rankes	the remainder	the number of the flanke & 20 [illegible]
100	14	7	2	42
150	16	9	6	51
200	20	10	0	60
250	22	11	8	66
300	25	12	0	74
350	26	13	12	78
400	28	14	8	84
450	30	15	0	90
500	31	16	4	94
600	35	17	5	103
700	36	19	16	111
800	40	20	0	120
900	42	21	18	126
1000	45	22	10	133
1100	47	23	19	140
1200	48	25	0	147
1300	50	26	0	153
1400	53	26	22	158
1500	55	27	15	164
1600	57	28	4	170
1700	58	29	18	174
1800	60	30	0	180
1900	61	31	9	183
2000	62	32	16	189
3000	76	39	36	231
4000	88	45	40	267
5000	100	50	0	300
6000	109	55	5	328
7000	118	59	38	354
8000	126	63	62	378
9000	134	67	22	402

10000	140	71	60	423
11000	148	74	48	444
12000	155	77	65	464
13000	160	81	40	483
14000	166	84	56	501
15000	172	87	36	519
16000	179	89	69	536
17000	184	92	72	552
18000	189	95	45	568
19000	195	97	85	584
20000	200	100	0	600
21000	205	102	90	614
22000	209	105	55	628
23000	214	107	102	642
24000	218	110	20	657
25000	223	112	24	670
26000	228	114	8	684
27000	232	116	88	696
28000	237	118	34	710
29000	241	120	80	722
30000	245	122	110	734
31000	248	125	0	747
32000	253	126	122	758
33000	257	128	104	770
34000	261	130	70	782
35000	265	132	20	794
36000	268	134	88	804
37000	272	136	8	816
38000	275	138	50	826
39000	278	140	80	837
40000	283	141	97	848
nombre off men	men in a ranke	rankes	remayn	ffronte off grond

The 80 devise

And furthermore as it is the strongest way
for you to inbattell your selfe to be square upon
the grownd for that there is more men occupied
to fight so in this maner yt is ye weaker way
then to be square in nomber yf yt you showld
have any charge geven unto the flanck or syde
of the battell wherfore I doo thinke it very
necessary for to shewe unto you how yt ye syde
of the battell may be as stronge as ye frount yf
yt ye weapons be sorted therafter for that
there shall have as many men in a ranck for
the syde as there is for the frount upon the
sodayne and the battell never depart from yt
grownd as this ye nomber of men in ye frount
beinge dobell unto the nomber of ranckes then
yf yt there be any charge geven unto the syde
of the battell ye grownd beinge square there
is but to torne there faces unto there enymes &
then two ranckes will make one just as for
an ensampell of 100 men and to be squared

vpon the grounde there shalbe 14 men in a ranke
and 7 rankes and the ground shalbe 42
foott square then yf yt they haue a charge
geven unto ye feld then they tornynge their
faces unto their enymes then they are butt
7 in a ranke and 14 rankes and then
there is 6 foott asonder betwene every man
then lett ye next ranke com unto ye fyrste
ranke and then there willbe 14 men in a
ranke and so every too rankes may make
one ranke and then there is but 3 foote
as was before betwene every man in the
front of the battell and 6 foott betwene
every ranke &c

Se 81 down

And furthermore I do thinke yt conveniennt for
to shew unto you how for to be square upon ye grounde
for any nomber of men what space so ever yt you wold
haue betwene man and man both in length & bredth
as acordinge unto ye order of Nycollas mangisfelde
which is in length for every man 7 foott and in bredth
3 foote &c or allso yf yt you wold haue your armye
of men to shew bigger and to be square upon ye grounde
then your space betwene man and man must be

order as to alowe 9 foott in lengthe for every man and
4 foott in bredthe accordinge unto ye minde or fancy of ye
generall & allthoughe yt ye accostomable manner hath
ben accordinge unto ye experimentes of divers authors in
marciall affaires to alowe but 6 foott in lengthe and
3 foote in bredthe called of most authors ye brode
square ~~upon~~ accordinge unto ye tables in ye 79 chapter
and now to be squared upon the grounde what spaces so
ever yt you woulde have betwene man and man bothe
in lengthe and bredthe then do this first looke how many
ffoott yt you will alowe in lengthe off grounde for every
man then you must moltiply your nomber of men by
ye nomber of foott in lengthe yt don then devide ye nomber
so moltiplied by ye nomber of feett in bredthe yt you have
alowe for every man and yt don then extracte ye square
roote of yt nomber and yt shall shew unto you how many
men shall be in a ranke for ye front of ye battell and
then to knowe how many rankes of men there be do this
looke how many men yt you have in ye ranke for ye
front then devide yt nomber by your proper or trewe
nomber of men and yt shall shew unto you how many
rankes yt there shallbe of them &c as for an example
this I having 30000 of men and I would knowe how
many men yt there will be in a ranke and how many
rankes of them to be squared upon ye grounde alowinge
for every man 7 foott in lengthe and 3 foott in bredthe accor
dinge unto nicollas manchifolde order and to knowe

that do thus first your nomber of men beynge 30000
and alowynge 7 foott in length for every man therfore
moltyply 30000 by 7 and yt commeth unto 210000 (
then devide yt nomber agayne by ye nomber in foott that
you doe alowe in bredth for every man (which is 3) where
fore devide 210000 by 3 and then ther will stand in ye
quantitie lyne 70000 then extracte ye square roote of
70000 and then ther will stand in ye quantitie lyne 264
so yt you may conclude yt 264 men shall be in a
rancke for ye froont of ye battell and now to knowe how
many rancks of men yt ther shalbe for ye syde or
flancke of ye batell then do thus your nomber beynge 2
264 men in a rancke and your nomber of men beynge
30000 wherfore devide ye 30000 by 264 and then ther
will stande in ye quantity lyne 113 and then ther re
mayneth over 168 so yt you may conclude yt 30000
men to stande square upon ye grounde alowynge 7
foott in length and 3 foott in bredth for every man will
be 264 men in a rancke and 113 rancks and 168 men
will remayne over which 168 men you may imploy at
ye discretion of ye generall and allso yt will make on man
more in a rancke and then ther shall be 265 men in
a rancke and 113 rancks and 55 men will remayne
over (etc) and allso by thus order you may imbatell your
hoast square upon ye grounde what space so ever yt you
would be betwene mann and man in length and bredth
wherfore I will geve a seconde insampell you havinge
10000 men and would have 9 foott in length for every

man and fo 4 foott in bredthe wherfore multyplie 10000
by 9 and yt maketh 90000 then devide the 90000 by 4
and then ther will stonde in the quantitie lyne 22500
then extracte the square roote of 22500 & then ther
will stonde in the quantitye lyne 150 so that you may
considered that 150 men shall be in a ranke for the
fronte of the battell and then your nomber of men beinge
10000 therfore devide the nomber of men by the fronte that
is to say 10000 by 150 and then ther will stonde in the
quantity lyne 66 and then ther remayneth over 100
so that you may considered that 10000 men alowinge every
man 9 foott in length and 4 foott in bredthe to stonde
square on the grounde wilbe 150 men in a ranke and
66 rankes and 100 will remayne over whiche 100 men
will make on man more in a ranke that is 151 men
in a ranke and 66 rankes and 34 men will remayne
over and so by this meanes you may Inbattell your selfe
square upon the grounde what space so ever that you would
have betwene man and man both in length & bredthe
and then yf that you would knowe how many foote
square in grounde that they do occupye then it is best to do
this multyplie the nomber of men in a ranke by the nomber
of foott that they do occupye in bredthe & that shall shew
unto you how many foott square in grounde that they do oc
cupy or elles you may do this multiply the nomber
of rankes by the some of the nomber of foott that they have in
length & that in like maner shall shew the square of the
grounde that they do occupye in like maner

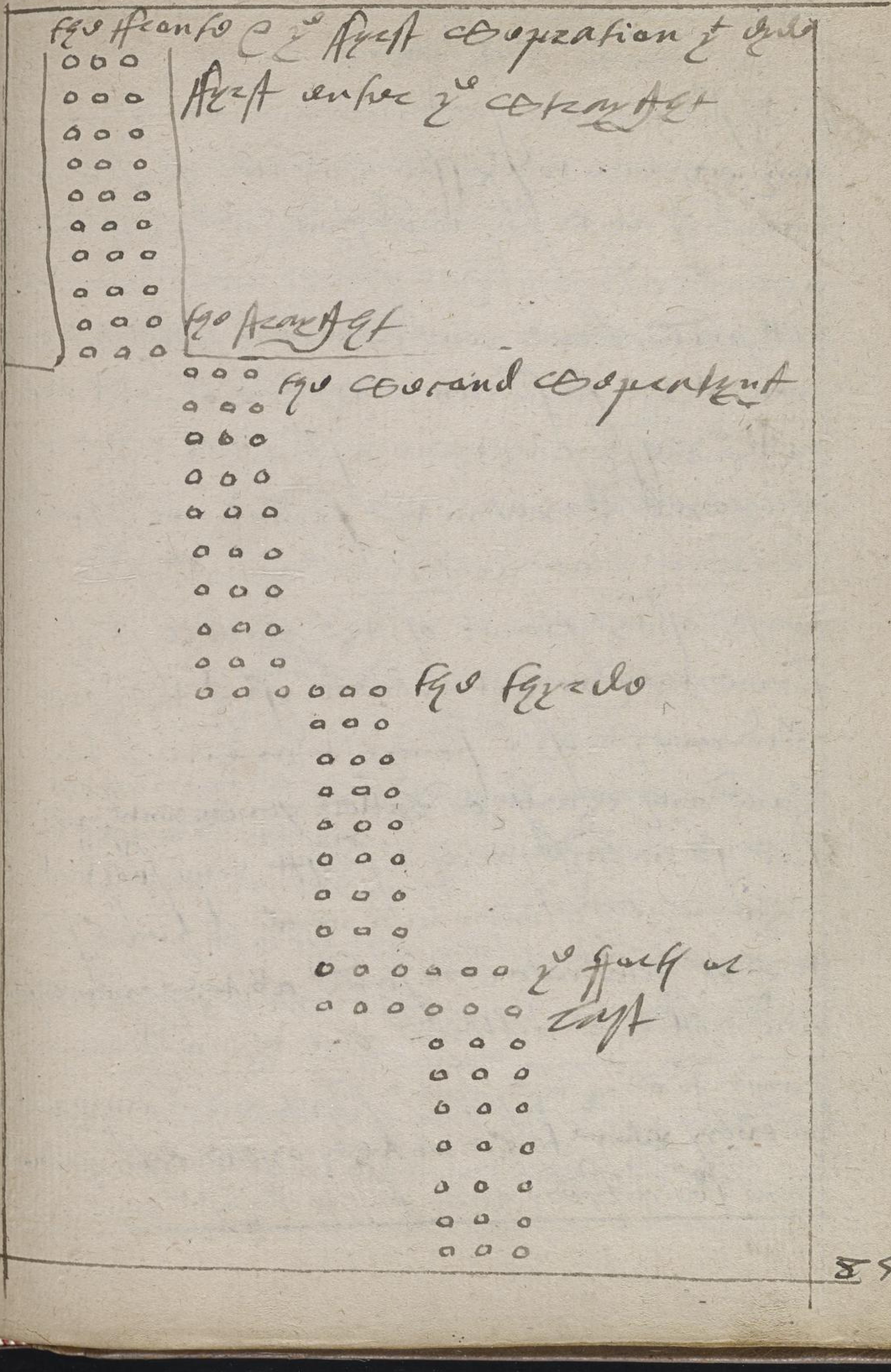
The 82 Idem

and furthermore you havinge any nomber off men &
you havinge so many weapons off every sorte more or
less as it happeneth whether yt you would be square
and ye rounde or other wyse, you once knowinge how
many men yt you would be in a ranke you may kno
howe many rankes yt there will be off every sort off
weapon at your pleasure as this yt is no more but to
devide ye nomber off weapons off every sorte by ye nomber
off men yt you would be in a ranke and ye nomber yt
standeth in the quatient lyne shalbe ye nomber off
rankes &c and this by devidinge every sort off weapons
by it selff by ye nomber in a ranke you shall perfectly
know how many rankes yt there shalbe off every sort
off weapons &c and this I doe saye as touchinge the
settinge off ye sortes off ye weapons refferringe yt unto
those yt are expert in those cases and also ye formes
off sundry battelles as triangles double and single ye
battell called ye halff mone other wyse ye hornes or
tornes forwardes or backwardes and ye sleves or
wynges off battelles I will not take upon me to dele
in those cases but I do reffer yt unto those men off
experience in that affaires &c

The 83 dem

nowe you beynge Inbattelled in any place wher
yt you are neare unto your enemyes & yet for advantage
sake you wold take an other peace of grounde
more better for your purpose and yett you canne
nott com unto it in your battellforme by ye meanes
off some straight yt you must passe therowe be
fore yt you cann com unto it and for yt you are
Inbattelled and woulld nott alter theyr forme
yt frome off battell then to passe therowe ye straight
so thers the place beynge veryd before hand how
many men may marche therowe in a ranke
therowe that straight and then apoyntinge
your officers as ye captaynes off ye 100 vyntenors
or the other officers for yt purpose to marche
therowe ye straight acordynge unto yt nomber yt
may marche therowe and then when yt they do
com at ye straight lett the holl battell stay
and then yff yt it be so narrowe yt they may but
3 men passe therowe in more or less as ye place
is then begynne at the syde off ye battell and

then lett 3 off ye frount begynne to enter and marche
in and then 3 off ye next ranke and so forthe unto
ye last ranke and then at ye end off ye laste
ranke lett them 3 off ye first ranke follow a
gayne and so forthe untell yt they be alle entred
and gon into ye strayght and then when that
the first 3 in a ranke is thorow the strayght lett
them stay and then lett ye next 3 in a ranke com
up by them ~~the~~ untell yt he yt was in the front
be wth them yt is in the frount yt first entred
the strayght &c and so lett them all stay and
ye one com up by the syde off the other untell that
the hole battell be in forme yt it was before



The 84 order

And fmder more yf that youe in youre marchinge hav
any occation to shifte the nomber of men in a
ranck that is to say to be somtyme more men in
a ranck and somtyme fewer men a ranck and
yett wold ~~kepe~~ youre weapons sorted as they
ware at the first as in the order next before
in the passinge thorow a straight there the
weapons that was in the front ar desparsed
in every place accordinge unto the often separa
tynge of the front of the battell so that in this
forme they ar but weake yf that they war a
shod owght of the straight where that they myght
have any charg or battell geven unto them where
fore for an easyer way to shift youre selfe to be
what nomber of men in a ranck that you lyst and
to ~~kepe~~ your weapons sorted as they wer before
and nott to be alltered but them that was in the
front to be in the fronte still and so consequently
in every place to be as they ware before and
now for a spedy way for to bringe youre men

frome one nomber off men unto another this ys
to be noted yff yt you be 3 men in a ranke and wold
be 5 then 5 rankes will make 3 rankes and you
beynge 3 in a ranke and woolld be 7 in a ranke
then 7 rankes will make 3 rankes and beyng
3 in a ranke and wold be 9 in a ranke then
3 rankes will make one and beyng 3 in a
ranke and wold be 11 then 11 will make 3
and beynge 3 in a ranke and wold be 13 then
13 will make 3 and beyng 3 in a ranke wold
be 15 then 5 rankes will make one and then
yff yt you woolde be 17 in a ranke then 17
rankes will make 3 and yff yt you wolde
be 19 in a ranke then 19 will make 3 and yff
yt you woold be 21 in a ranke then 7 rankes
will make one ranke &c/ and yff yt you
be 5 men in a ranke and woold be 7 in a
ranke then 7 rankes will make 5 stille
you beynge 5 in a ranke and woold be 9
then 9 will make 5 and yff yt you wold be
11 in a ranke then 11 will make 5 and yff

yt you woolde be 13 m a ranck then 13 will macke
stand yff yt youe woold be 15 men m a rancke
then 3 rankes will mack one the and furthe
more you beynge 7 men m a ranck and wold
be 9 then 9 rankes will macke 7 and youe
beynge still 7 and wold be 11 then 11 will
macke 7 and yff yt you woold be 13 m a ranck
then 13 will mack 7 and yff yt you woold be
15 then 15 will mack 7 and yff you woold be
17 then 17 will mack 7 and yff yt you woold
be 19 then 19 will mack 7 and yff you woolde
21 then 3 rankes will mack one the / And
furthermore by yt order you beynge ye more
men m a rancke and woold be ffewer then
as is shewed before you beynge 21 m a ranck
and woold be but 3 then one ranck will mack
7 and yff you beynge 21 men m a ranck and
woold be but 5 then 5 rankes will mack 21 and
and yff yt you woold be but 7 m a ranck then one
rancke will mack 3 rankes the / and so by this means

you may alter your selff from one nomber vnto
ane other and never vnsorte your weapon as when
yt you lyst to alter your nomber of men in a rancke
then it is but to apoynte your offecers in every place
at the rancke of so many rancks to put them in to
what nomber yt you doo assigne them &c at your plesur

The 85 devis

And yff yt it happen when yt you asett in your
battellforme and your enemyes at hand redye to
fyght wth and by fortune ether of great ordynance
or by small shott yt ye fromt or dyvers rancks
of your battell yt ye men are slayne or spoyled, and
then yff yt your enemyes do encounter wth you then
you must needes be over throwne except yt the fromt
and those rancks be supplied agayne wth men
nether you must not be owght of order for then in
lyke maner you should be over throwne and to runne
away then you in lyke maner should be overthrown
wherfore this is to be notted and yt those yt are ye officers
of the bandes have adilygent forsyght yt as some
any man ys strocke downe by any missfortune yt
the rome be supplied agayne forthwth straight

way is this to be done and never to be oughte off
order for ye matter and ye rankes to be fornyshed
forth wth as this the sowdyers must have this in
structiones yt as sone as he doth se his fore mane
stroken downe or mysing yt he doth stepe into his
place and so every one of them to stepe forwardes un
tell yt it doo com unto ye last ranke and so by yt means
yt those men that ware taken away in the fyrste
rankes yt they shalbe trymed unto the hinder moste
rankes of all &c and this they may doe bothe
in ther marchinge or goinge as well as in stond
ing still for in ye goinge he must goe faster then
his followes untell yt he doth come so fare for wardes
tell yt ye rankes be fornyshed agayne and yf so be
yt yt ware so yt in ye fyrste rankes yt ye men ware
spoyled untill ye myddell of ye battell in every ranke
then he yt is in ye myddell of the battell shold never
sease but to goe before his followes untell yt he ware
in ye forefronte of the battell and so in all ye rankes
untell ye last ranke to com forwardes in lyke
manner and so by that meanes ye wantes of men
shold be in ye hinder part of the battell & fornyshed
in the fore part of ye battell &c

the ffronte sparkled

o o o . . . o . . o
o o . o . . . o . o
o . o o o . o . o o
o o o o o . . o . o
o o o o . o o o . o
o o o o . . o o o o
o o o o o o o o o o
o o o o o o o o o o
o o o o o o o o o o
o o o o o o o o o o

the ffronte formeshed
& fayne as men

o o o o o o o o o o
o o o o o o o o o o
o o o o o o o o o o
o o o o o o o o o o
o o o o o o o o o o
o o o o o . o o o o
o o o o . . o o . o
o o o o . . o o . o
o o o . . . . . . o
o . . . . o

the rearwes at last
behynde in ye tayll
off ye batelle &c

The 86 daye

And ffurther more as touchyng ye fformyng of battell
ther is greatt wysdom and polisye bothe in ye sortyng
off ther weapons and alsso in ye inbattellyng off them
consideryng whatt fframe ye your enemyes be in how yt
they are prepared bothe in ther weapons & otherwysse
and so you to inbattell your selff agaynst them yt you
may have ye avantage off them yff yt it be possible
consyderynge off every thinge yt may happen as well
off thinges yt are agaynst you as off thinges wt you
that is to saye consyderynge off the nomber off men off bothe ye

sydes ye furniture and the weapones one both the sydes
the forme of ye battell on both the sydes ye avantages of
the groundes whether yt it be by hill or by any other
meanes as ye wynd or ye sonne or water or such other
lyke &c and also there is greatt matters yt may happen
in ye usenge of som kynde of fyght consyderenge of ye
weapones one both ye sydes for they must use ye fyght
of any weapone accordynge unto ye weapone yt he fyghteth
agaynst and so to seake ye advantage yt wayes as yt it
may be / as in my opinion yf yt ther were to battells
reddy to be Joyned togyther ye one agaynst ye other and ye
nomber of men on both ye sydes to be equall and also in
ther appoyntment ye weapones and furnyture to be alyke
and also in forme of battell alone and also ye one to
have no advantage of the grounde one ye other nether
in no other thinge but to be all alyke in all poyntes
and suppose yt ye fronte of both the battells is precise
and the one as many men in a ranke as ye other yett it is
possible yt ye one may over throw ye other at the first mee
tyng of the battell wt fought any recovery by ye meanes
of the order of the fyghtinge as this ye on battell commeth
accordynge unto the accostomable maner thinkynge
to stand at the ryske of the pyck wt them and the

other battell cominge in ye forme in like maner untill
yt they ar in maner hard unto them and then upon ye
soddayne they doe all at that sodayne ye fare frounte in
marcher unto gether so close as they cane cominge
in shoulder unto shoulder and then ye rankes yt ar behind
for the quantitie of more ye halfe of ye battell doth lyke
and so doeth come close unto ye backe of them that
ar before and so cominge wth great violens and the
poyntes of ther pykes forwardes yt ye must neades
pearce and enter ye frount of the other battell for them
that ar beffore must neades come in unto them for
that them yt ar behinde doth force them in and them
that ar of the other battell must neades geve way
or elles fall downe and be troden under feete and then
yf yt they be ones seperated and put owght of ther
order they must neades be over throwen wth [illegible] and
victorey &c wherefore ther is great polisey to be used
in fyghtinge at the Joyninge of battelles and allso in
ye ordering of ther weapons and allso in ye forme of
the battelles as in ye devydinge of them selves in sondrye
battelles as winges and such other lyke thinges
I pass over refferringe it unto those yt hath seene
the experience &c thereof &c

The 87 devise

And furdermore yff that it hapen so that you doe chance
for to be over matched and that you do knowe that your ene-
myes be to stronge for you by the greatt strenght off
ther horssemen and the nomber off men to many for
you that yff you shold fyght with them that you most nedes
be over throne then to prevent them that they shall nott
be abell to geve any charge upon you then invirone
or compas your selfe rownd a bowghtes with your carradges
that is to say with your wagons or cartes and so by that
meanes the horsse men shall nott be able to enter upon
you nether the footmen but that you shall be abell to
defend them &c and yff that you it hapen so that you have
nott soffycyent off wagones or cartes to invirone or com-
pass you rownd a bowghtes then you may goe neare
unto some hedge or dych or such other lyke to be your
deffendyr for the one syde and then you may place your
carradges one the other syde

The 88 devise

And furthermore yff that it hapen so that you ar abrode
with a bande off men and that you ar belayde betwene you
and home both by horssemen and by foott men and that
it is nott possible for you but yff that they do charge upon
you but that you must be over throne and you havinge

no wagones or carrodges to compas your selfe + them
repare unto such a place that is full off bushes as thornes
and brambelles and ther you may easy defend your selfe
for that the horse men shall nott be abell to geve any charge
upon you and allso ~~the~~ as for the footmen you may defend
your selfe &c. ////

The 89 devise

At touchinge thes yf yt it doth happen so that you are
driven to travell by nyght whether that it be to doe
any exploitt or other wyse and that you are smalle
shotte
as hargabuzeres or ~~calevres~~ and that you wolde
carry your match ther that you woold nott have it to
be seene of the scoutes or watche of your enemyes then
you must doo this every man must prepare a peace off
a canne off 5 or 6 inches longe and must putt a stringe ther
unto and hange it by his gyrdell as you do the shete off
a knyffe and the peace off cane must be open at both the
endes and then the match beynge lyght you must putt
that in to the hollow cane the end that is lyght and
so the matche will burne in the cane and the lyght therof
never be seene &c and this devise is very good to carry your
match in the rayne wether for that the wett shall nott
tuche the fire off the match and you may oper as the match
burneth you may feade it or putt it in forder & forder &c

The 90 devise

And further more yf that you have a watch or scoutes abrode
in the night and that you would knowe whether that
there be any horsmen cominge and the night beinge so
darke that you can nott see yf that any ware cominge yett
by this meanes you may knowe yf that there war any
cominge as this make a holl in the grownd with your dagger
or knyffe of a 2 or 3 inches depe and a 3 or 4 inches over
* and then stope downe unto the grownd and lay your eare
thereunto and then you harkeninge there unto and yf that
there be any horsemen cominge you shall heare them
and you shall knowe whether that they do com fast or softly
and whether that there be one or two or a nomber of them
by the verry noyse of the grownd half a myle before
that they do com neare unto you by the verry noyse of the
grownd and allso yf that it be upon som harde grownd
you may heare them more then a mylle and also upon
such grownd you may here footmen a quarter of a mylle &
whether that there be but one 2 or a nomber of them &c

The 91 devise

And further more as touching them that doth travell by night
in such places that is in his enemyes contery and that he can
nott travell by day for feare of beyng spyed in the day

the ~~kepe~~ ye comon hyghe way for feare off beyng mett
wth all as it may happen by them yt hath byne taken
off his enemyes and have broken prison or otherwyse
to cary letters and such other lyke then it behovethe hym
for to knowe whiche way yt ye place dothe stond from hym
yt is to say unto what parte off the world whether yt it be
east west northe or sothe and then accordinge as ye place
dothe beare so to derect his way and so accordyng unto yt
to cost over ye contery ye nereste way and to governe hym
by nyght in his way he must use the northe starr and
so in ye nyght to derect his way by yt yff it be starr lyght
and by day he may use the nedell off a diall when he
travelleth in such places yt is owght off the hyghe way
as in wodes and forrest and such other lyke places &c
yff yt he have no diall then he must note the place off
the sonne rysynge and the settynge and the place off none
&c untill yt he doth com neare unto the fronteres off the
contery where his frendes are &c

The 92 devise

And yff an armed man be persued and is in danger to be
taken except yt he may swym over a watter then for
hym to swyme over a watter he may prepare this to mak
a thinge to goe rounde abowt his body as hyght as his
bryst mad off lether and sowed tyght and blow it full

of wynd by a pype yt must be mad ther unto and so yt thing
will mak hym swym alltho he have an armor on his
back &c //

The 93 devic

And yff yt an army of men and ther caryges ar to passe
over a ryver or water and they having no provision of
botes yett they may mak a brige in this maner fyrst pre
pare caske as pypes or hogsheds and then tak long
tymber and then mak a fram ther wyth in this maner to
fram 2 peases to gether somewhat shorter in bredth then
ye lenght of the cask in this maner

much lyke unto a lader butt much byger
and stronger and you having prepared a soficent
number of thes then tak your cask beynge mayde
tyght and then tak those tymbers so made together
and then put ye cask betwene of tow of those framd
tymbers ye one beyng layd close unto the other and then
mak fast those too frames ye on beyng of the one syd
of the cask and ye other on ye other syd of ye cask and
then mak them so fast yt ye cask will nott stor and
so to mak it so longe yt it will goo over ye ryver or water
and so to have tow rankes of cask in those frames &
then those to rankes of cask beynge placed crose ye
ryver then prepar planckes to lay upon those to rankes

off boates tyed unto gether and then beynge mad fast
unto the tymber yt they do nott sterr from ye place then
the holl army may passe over and ther carryages &c
and all for yt ye hast will nott suffer ye bryge for
to synck allthoffe yt they do drawe the ordynance
over it &c

The 94 devise

And furthermore yff yt an army of men ys for to passe
over a brode watter wher yt ther doth runne a grett
tyde or strem and by ye meanes of ye greatt brodth
and the swyfft stream it is nott possyble to make any
bryge to pass over it yett nott wythstandynge it
is possyble to carry such provysion wth them yt may
make so many botes wch in less tym then a day as will
carry all ye holl army over at one or twyse allthoff yt ye
watter wear 2 or 3 myle over it and yett that provysion
that they shold carry wth them shold nott aske no
greatt matter in cariedge for one wagon or cart
shold carry as much provysion to make botes to carry
over 400 or 500 men &c as this fyrst prepare lether
and then lett them make the moulde of a bott of 20 or
30 foott longe more or less at your dyscretione and

in depthe 3 or 4 foott at your dyscretion and of 8 foott brode
more or lesse at your dyscretion and yt donne lett ye lether
be made lyke ye moolde of ye boott yf it may be
fitt to be drawne one upon yt and ye seames so sowed or closed
yt it doth nott leke yf it may be tyght to hold owt water
and yt donne then to have in soundry places certen stropes
or stryngs to make yt fast and then it is fynyshed
and then it may be ffolded uppe and layd in cartes or wag
gons and then you may make suche a nomber off them as
shalbe soffycient to serve your torne as a botte of 30 foott
longe and 8 foott brood and 4 foott deape will carey 40
or 50 men at ease &c and then when so ever yt you doe
meane to pass ye army over any ryver then repare unto
some place neare unto ye ryver syde wher ther is som yong
woodes and then yt shall serve your torne to ye intent to
make your bottes as this cutt downe of yt yonge wood &
then cutt one mayne peace to make it for the keell of
the botte and to cutt yt of yt lengthe according unto the
lengthe of the moulde yt was first made and so a peace
for the stem and ye sterne post accordyngly and then
certayn pooles to cutt for the sydes and so forth and
so consequently to every place and then lett them be framed
and nayled together in all places and yt donne lett ye
lether be drawen on over yt agayn mad fast wt ye stropes

and then it is fynysshed and then for ~~thatmen for~~ that
ye men may nott tread upon the tother in the bottom
of the bott they may ether ye spare bordes or elsse to make
hardells of purposse and then thes bottes beinge putt
in to the watter they will swyme as well as any other
bottes and may rowe to and frome and yf it were
to goe 100 mylles &c wherfore they must make some
provysytion of owers for them &c

The 95 devyse hipsometrie

As tocheinge this for to know whether yt eny grownd
be hier or lower then ye grownd yt you do stand upon yt is
knowen by yt order as in ye first devise by the lyne of ye
horrizon yt allwayes lokyng and markynge howe
the fardest part yt you do see doth cutt upon the grownd
yt you dodesier to know whether yt it be hier or lower
and loke at what hieth you doe see ye horrizon that is
equalle in heth wth the syght of your eye and then so
cattynge yt heth upon ye other grownd then it is equalle
wth your feett and yf that ~~it~~ you do see ye horryzon cutt
over ye other grownd then ye grownd is lower then the
grownd yt you do stand upon &c and allso yf yt you are
amongest hilles and yt you can nott see ye horryzone
cutt then you may know whether yt it be hier or

lower by a squier hanginge a plomett of leade at ye corner and sett the edge of ye squier iust wt the lyne and then take your syght by ye uper part of the crosse and so beholding ye place you shall know whether yt it be hier grounde or lower &c //

The 96 door hidrostaltie

for to knowe whether yt it be possyble to bring ye water of any springe unto any place Asygned it is thus know or to know howe hie yt it may be raysed it will always com unto any place yt it is any thinge in lownes under nethe ye place yt ye spring cometh forth of / and it may in like manner be raysed in hythe at your plesur so yt it be any thing lower then the heade therof alowinge for a myle in distance from ye hede of the spring to be 3 inches and a hall hier then the place yt you would rayse it up unto and for 2 myles 14 inches &c / for ye tirculernes of the earth &c for to know whether ye grounde be hier or lower it is declared in the door going before //

The 97 door hidrostaltie

And further more for to turne a watter core as a water that passeth thorrow a towne of your enemyes as it is one of ye principall anoyances to take away ther fresh watter from them sand to do it this they must do first that they must vewe ye watter core / and wher by the way yt ther is any

ground yt is lower then ye ground yt ye water cors ronethin to consyder whych way then that ye water will ronne for yt it will all wayes seeke unto ye lower ground and then upon the vew thereof for you must accordyngly make ye way thereof for to condyt the watter past those places yt it may retorne unto ye water corse agayne and all yt consydered and done then cutt the way thorro unto ye lower ground and make a dame hard below yt in ye old water cors and so by yt meanes you may torne a small ryver or watter corse &c

The 98 devise hipsometrie

for to know ye hythe of any tower by ye skalle off ye astrolobe or quadrant ye skall beynge 12 parte or devisions by upryght shadow yt is to say to knowe the hyth wyth in ye lenght of ye thynge at ye parte 12 ye mesur unto ye thynge is ye hyth of the thynge at the part 6 ye mesur unto ye thynge is halff ye hythe of ye thynge at ye part of 4 yt is ye third part of the mesur of the hyth of the thynge at ye part 3 is a quatter of ye mesur of ye hyth of ye thynge at the part one ye 12 part of ye hyth of ye thynge &c as I do finde shew in the 2 chapter of ye first part of my booke called a tresur for travylers

The 99 devise hipsometrie

for to know ye hyth of a tower by upryght shadow

when yt it is so yt you cannott com vnto ye base or foott
of ye tower then you must haue to stationes or standynge
and ye first one ye part 12 and ye next one ye part 6 then
ye mesure betwen ye to standynges is halfe ye heyte of ye
thinge or ye first one ye part 12 and ye next one ye part
8 then ye mesure betwene ye too standynges is ye therde
part of the hyth of the tower or ye one on ye part 12 and
ye other ~~part~~ on ye part 9 then ye mesure betwen ye two
standynges is a qr of the hyth of the wall or tower ye
one 12 and the other 10 then the mesure betwen ye tow
ys the 6 part of the heyth of the thinge &c and then yf
it happen so yt you can nott goe so farr back then loke how
many partes yt ther is betwen ye to standynges and
loke what part that is of 12 so shall you know what
parte of it is ye hyth of the thing as this yf ye devysyon
of ye partes be 6 then it is half the hyth yf yt it be
4 then a therde part of ye hyth yf 3 then one qr of ye
hyth yf 2 ye sixt part of ye hyth and yf but on then
yt is the 12 part of the hyth &c as I do more at large
declare in ye 2 chapter of my first part of my boke
before mentioned &c

The 100 devise hipsometrie

To know ye hyth of a tower by contrary shadow yt is to
say [illegible] ye hyth of the thing &c ye first standyng on

the poynte 12 and the next standing on ye poynte 6 of contrary
shadow then ye mesur betwen ye too standinges shalbe
ye heyth of ye thing just and ye first standing on ye part
6 and ye next one ye poynte 4 then ye mesur bytwen ye too
standinges shalbe ye heyth of ye thinge & the first standing
on ye part 4 and ye next one ye part 3 ye mesur betwen ye
two standinge shall be ye heyth of the thinge and the
first standinge upon ye part 3 & ye next upon ye part
2 then the mesur betwyn ye too standinges shall be
twyse the heyth of the thinge yt is to say ye halfe ye mesur
shalbe ye heyth of ye tower stepell or wall and ye on stan
dinge on ye poynte 2 & ye other other one ye poynte one ~~standing~~
then ye mesur betwen ye too standinge shalbe 6 tymes ye heyth
of ye thinge then ye sixt parte of ye mesur shalbe ye heyth
of ye thinge &c as ys more planly shew in 3 ye chapter
of ye first part of my boock ~~tall~~ before reherssed

The 101 devise

And to know ye part of ye heyth of any thing as ye length
of a wyndow or ye length of a pinacoll or ye length of any
thing yt is a loft then take your syght at ye poynte 12
first ye uper end and then ye lower end and then ye
mesur betwyne those two standinge shalbe ye length
of ye thing &c as I do in lyke maner shew more
playnly in the 4 chapter of my boock before
rehersed

And to knowe ye dystance unto any marke by ye staff ye
marke beynge off any dystance from you then it is best
to lay ye astrolobe or quadrant flatt wth ye staff upwarde
for in hanginge off it you may comytt error quickly and
perceve it nott & for ye fyrst standynge then take a
twart marke makynge a squar angle & you must goe
derectly unto it After yt you have obzarved ye thinge
yt you doo reckone ye dystance unto and then when yt
you ar com unto your twart marke then sett ye astrolobe
as it was before yt is to say ye lyne off levell to stond
just wth yt place yt you did depart from and then
yff yt ye marke desend at ye part 12 then ye marke
ys from ye place off ye fyrst standynge as muche more
as it is betweene ye tow standynges just and yff
at ye part 6 then ye dystance frome ye place off the
standynge unto ye marke shalbe dobbell unto the
messur betwen the tow standynges yt is to say yt ye
messur betwene ye the tow standinges ys but halff
ye dystance unto ye marke and yff at ye pte 4 then
the messur betwene ye tow, standinges is but the third
pte off the dystance unto ye marke and yff at the
pte 3 then it is but one qrtr off the dystance unto ther

marke and yff at the 3te tow then it is butt the fyrst
pte off the dystans unto the marke and at ye pt one
then it is but ye 12 pte off the dystans unto ye mark
as I do mor planly shew in ye I chapter off my book
before whereof &c and by this meanes you may
know ye dystans unto any marke as unto a shipp
yt is ~~atte~~ an ankor in any haven or ryver &c

The 103 dyvr Apomecometrie

And further more you may know ye dystans unto
any marke wt ye crosse staff or the lenght of any
wall or ye dystans betwene any tow markes as
this yff yt you doe sett ye tranvastory ye lenght off it
frome the eand and then you stirring the to eands off
ye transvastory wt ye to eandes off a wall by ye syght
off your eye then mesuringe ye dystans unto ye wall yt
mesure shalbe just ye holl lenght of ye wall and
then yff yt you may nott com unto ye wall then you
must make tow stondynges &c by ye mesure betwene
ye tow stondinge you shall both know ye lenght off ye
wall & ye dystans unto ye wall as this fyrst stond
derectly agaynst ye myddest off the wall & then remove
the transitory forwarde or backwardes untill yt you
do see the tow eandes off ye transytory to agre wt the

ton eandes of ye wall settyng ye stand of ye longe staff hard
under your eye & stand then at your foott mak a marke
and then goinge backwardes and then remove the
transvetory ont this hole lenght forwardes and so still
you going back untill yt ye two eandes of ye transvetory
do the agayne by ye sight of your eye with ye two eandes
of ye wall then at your foott there mack an other
marke and then mesure ye ground betwene ye two markes
and that is ye trew lenght of ye wall and then too
know ye dystance unto ye wall then looke how many
tymes yt ye lenght of ye transvetory ys from ye eand
next unto you and so many tymes ye lenght of ye wall
it is frome your standing unto ye wall & as I do more
at large shew in ye 9 chapters of the first pt of
my booke called the tresure for travelers &c

The 104 A pomecometrie

As toucheinge this how for to knowe ye dystance
unto any place or places by ye horryzontall sphere and by
this Instrument you may take ye platt of any grownd
whereby yt you may mack a mape or carde to know ye
dystance unto any towne castell or hyll tower or
chirch or whatt so ever yt it be worthy of knowledge
as this gett you up unto some hye place that you may
a backstaff and
see ye country round, sett the Instrument flatt before

~~bothat~~

you and then sett it by ye neadell of ye northe p[ar]te be to
ye norwardes and ye east and west and sothe p[ar]tes be
accordingly &c and then lett ye instrument stand
still and then torne ye athelydar or rolle wth ye tow
syghtes unto those markes yt you dow desire to know
ye dystance unto and so still remove ye athelydare
untill yt you may see ye mark thorow ye tow syghtes and
then loke at what poynt and degre ye ye athelydar
doth point unto and notte yt in a peace of paper for a
remembrance and so untill yt you have observed all
ye things wth in ye angle of ye syght and then goe unto
another place yt was your marke before and place
your instrument and then torne ye instrument untill
yt it doth stand dew north and sothe as it did before
and then observe all ye markes before observed a
gayne and notte it as you did before and then when
yt you do come home then accordinge unto ye notes so
taken then upon a shett of paper mark fyrst a cirkell
and devide it as you doe ye instrument and then
accordinge unto ye nottes of ye observation yt you
have in the paper so draw lynes from ye center of
ye cirkell unto ye devision of ye place in ye cirkell
of ye pointe and degre yt is mentioned in ye paper
of observations and so lett ye lyne runne in length

vnto ye papers edge yf yt it doth so reqwyer and so in
manner drawe as many lynes as you have observed
places at ye fyrst standynge and then on yt lyne yt was
your second standynge or place of your observynge
mark another circle and devid it as before is
rehearsed and then from ye center of yt circle draw
lynes vnto every one of ye devisiones as your notes
in ye paper doth shew and then ye one ~~hand~~ lynes will
cross the other and look at what place yt ye lynes
doth cross then accordynge vnto yt proportion ye
one place doth beare from ye other as well in distance
as vnto what partes and then you measuryng ye
distance betwene any two places and so makynge a
scale or compass of measure by ye proportion of the
length of ye lyne for those two places and then wt a
payre of compasses you may know ye distance
vnto any of ye places in yt platt at your pleasure as
is more at large declared in ye 13 chapter of the
first part of my booke before rehearsed

The 105 devis hipsometria

The distance vnto any place beynge knowen ye height
of any hill or ye deepnes of any valley may be knowen
how great it is hier or lower then ye place yt you doth

stondt upon by ye partes of ye staff as this at ye part ond ye
hyth or depnes is ye 12 parte of ye dystance unto ye marke
at ye parte tow ye hyth or lownes is ye 6 part of ye dystance
at ye parte 3 ye forth parte ye dystance at ye part 4 ye thrd
parte off ye dystance at ye parte 6 dobble ye dystance &c as
it is before declared &c and by this order you may
know ye hyth or ye lownes of any tower hill or depnes
of a valley at hand so yt yt be nott very farre of in
dystance &c as I do further declare in ye fyrst parte of my
booke before wher shewed &c

The 106 dore hipsometrie

for to knowe ye hyth of any hill or tower or steple
yt is any great dystance from you or ye depnes of
any valley or any other marke yf you do desire for 9
to know how much yt it is hier or lower ~~ther~~ then ye
ground you do stand upon then you must know yt
by ye degrees of an astrolobe or quadrant as this ther
dystance unto any place beyng knowen then yf ye
ye place be hier or lower by one degree then ye thinge
is hier or lower by ye 60 part of ye dystance as yf
yt it war 60 scor from you then it war on scor hier
or lower & a scor is 60 foott &c and yf yt ware tow
degrees hier or lower then ye hyth or lownes of ye
thing war ye 30 part of ye dystance in hyth

or lowndes and yff yt it war 60 score from you
then it war 10 score in heyth or lowndes yt is 120
foote &c and yff yt it warr 3 degrees hyer or lower then
it war ye 20 pte off ye dystance in hyth or lownes &
yff yt it war 4 degrees hyer or lower then it war ye 15
pte off ye dystance in heyth or lownes and yff yt it be
5 degrees hyer or lower then yt war ye 12 pte of the
dystance hyer or lower then ye grownd or plase yt you
doe stand upon and yff yt it be hyer or lower by 6 degrees
then it is ye 10 pte. off ye dystance hyer or lower & and
this foure ye degrees wch shewe unto you exactlye
ynoughe but yff yt it be raysed or delayed unto mor degrees
then it will grow unto error and then you must
use ye scale for yt ye degrees be ye devysyons of a whell

the 107 devic Apomecometrie

And fardermore by yt devic you beynge upon a hye clyff
or any hye tower by ye sea cost you may know ye dystance
unto a shipe yt is saylynge one the sea you knowynge
the heyth of the clyff or tower how many foote yt it
is hyer then ye sea watter & then you usynge it by ye
scale or ye degrees as by ye devises goynge before yff
perceyved as this yff yt one degree downwardes you do se

ye shepe then it is bot 60 tymes ye hythe off ye clyff or towre
vnto ye shipe and yff tow degres then ye dystance is 30 tymes
ye hythe off ye clyffe or towre vnto ye shipe yff 3 degres then 20
tymes yff 4 degres 15 tymes yff 5 degres then 12 tymes
yff 6 degres then 10 tymes yff yt yt grow mor degres
then tacke ye partes off ye scall and that shall shew vnto
you how many tymes ye hythe off ye clyff shalbe the
dystance vnto any shipe styllynge ond ye sea costhe as
in my booke I doe further shew &c

The 108 dede Apomecometrie

And furthermore by ye degres and allso by ye partes off the
scall you may knowe ye dystance vnto any shipe saylyng
vpon ye sea and you in lyke maner to be in a nother shipe
saylynge on ye sea allthoff that I do knowe ye opinion off
dyvers men excelently well seene in ye mathematicall
scyence ar nott off that oppinion for that ye tow marckes
beynge both movabell wherby that they can nott gett
no certen station that they hath thowght it most vn
possybell and yett nott wt standyng it is to be don
very certaynly as this as I doe shew in ye fyrst dyvi
sion for to knowe whether that one shipe doth goo to ye
ye other by ye standynge ond vp vnto ye tope to marke
how that ye lyne off ye horizon doth cott vpon ye other

shipes mastes or ye toppes for looke what parte soe
ever of ye he doth see wth ye horryzon is equalle in
heith just wth his eye and then you knowinge how
many foott yt it is from his eye downe unto ye water
in your one shipe so many foott it is just wth yt place
off ye toppe off ye ~~water~~ mast of ye other ship down unto
ye water so yt you may conclewd yt ye other shipe is so
many foott from ye toppe unto ye water and yff yt you
dow nott know ye heith off ye toppe off your owene x
shippe unto ye watter then yt is knowen by a lyne
and a plomett to be lett downe from ye top unto ye
watter and then ye heith off ye toppe off ye other shipe
beinge knowen how many foott yt it is hye above
ye watter then ye dystance is to be knowen as this
by ye degres as this gett you downe unto ye lowest
parte off ye shipe yt you ar in and then mesure you
from ye heyght off your eye downe unto ye watter and
then rebatt yt mesure frome ye heith off ye other shipes
mast from ye toppe unto ye watter and then ye wheich
doth remayne you must worke upon as this yff yt
owght off ye pte yt ye toppe off ye mast be one degre
hye then ye dystance is 60 tymes ye heith yff tow
degres hye then ye dystance is 30 tymes ye heith

as before is declared both by ye degres and allso by
ye partes off ye scalle ~

The 109 devn Apomecometrie

But ye best and ye shortest way to know ye trew
distance from you unto an other shipp on ye sea is
to doe yt with ye crosse staff and so shall you worke very
neare lye iff yt you doe handell it discretlye as thus
ye shipp yt you doe desire for to know ye distance unto
and as before rehersed you have founde yt she is so
many foott in hythe from the watter unto ye toppe
off ye maste and then take youre crosse staff and it
must be such a staffe yt ye transytory hath to plates
to be removed narrower or wyder and then remove ye
tow plattes unto ye myddell off ye staff at an inche or tow
a sonder at your descretion so yt you doe know justly
how much yt ye tow plattes be asonder and then sett
ye ende off ye longe staff hard unto ye corner off
your eye doynge in all poyntes as you wold observe
ye sonne or starr at ye sea and so removing ye transytory
backwards or forwardes untill yt you may see ye toppe
off the mast off ye shipp and ye lower part with ye edge
off ye watter to agre justly betwene ye to plates by ye
sight off your eye and yt beinge donne then looke how
many tymes yt ye distance off ye tow plattes be asonder

from the eand next unto your eye then so many tymes ye hyth
off ye toppe off ye maste downe unto ye watter shalbe ye dystance
unto ye shippe as for an Insampell this I beyng at ye sea
in a shippe and I do desire to know ye dystance unto another
shippe and then as before is declared I doe sende one unto ye
toppe off ye shippe yt I am in untill yt he doth see ye toppe off
ye other shippes maste Just wt ye horizon and then I
take a lyne ~~&~~ a leade and from ye place yt ye horrizon hyth off ~~[illegible]~~
downe unto ye watter ye leade and ye lyne is lett downe and
so by yt meanes you have founde yt ye other shippes toppe off
hir maste is so many foott as for an Insample it ys founde
to be 60 foott in hyth from ye toppe off ye mast unto ye watter
then I doe take my crossstaff and remove ye to ~~plattes~~ off
ye transytory untill yt they be Just one Inche asonder and yt done then
I doe sett ye eand off ye long staff hard unto ye corner off myne
eye wynckyng wt ye other eye and so lockynge towardes
ye other ship and removinge ye transitory to and from untill
yt I do see ye toppe off ye mast and ye lower part off ye shippe wt
ye edge off ye watter to agree Justlye betwen ye to plattes
by the syght off myne eye and then yt done I doe locke
how many Inches yt ye transytory is from ye eand next
unto me and then suppose yt it is 40 Inches wherfore then
I do concerde yt ye shippe is 40 ~~[illegible]~~ score from me for yt ye too
plattes is Just one Inch asonder and then ye transytory

longe 40 ynches from the ende then it must neades
be sayd that the shype is 40 tymes the heyghe of the mast unto
the watter in dystance from me and that beinge 60 foott and
60 foott is a score therfore I may conclude that the shype is
40 score from me &c

The 110 dem hipsometrie

And furthermore I doe thinke it convenient to shew unto *
you how that you may know the heyth of any tower or steple
or wall without any instrumentes as with a glass or
most chefest with a dyshe of watter as this after the
playnest order for that every parson hath nott arithmetike
to worke it by the proportion of a smalle triangle to know
the greater therfore for the avoydinge of those matters you
do this fyrst take a lyttell watter in a dyshe and then take
a staff or stick of 4 or 5 foott longe at your plesure and
then goe unto the tower or wall that you do requier to know
the heyth of and sett downe the dyshe of watter upon the grownd
betwene you and the tower and then lyfft your hed uppe
and downe untell that you do see the shadow of the tope of the
tower or wall in the watter and then sett the staffe upp
ryght before you and then the staff to be still upryght to
remove it forwards or backwardes untell that you may
see the shadow of the tope of the tower in the watter just with
the tope of the staff ~~agreinge with~~ by the syght of your
eye and then the ende of the tope of the staff agreinge with
the shadow of the tower in the watter then the ende of the

staffe at ye grounde standinge still at yt place then tourne
ye staff downe unto ye dyshe off watter and then yff yt
ye staff doth over reche ye dyshe off watter then remove
ye dyshe off water farder from ye tower or wall but yff yt
the staff doth com short off ye dyshe off watter then
remove ye dyshe off water nerer unto ye tower and so
to remove it in or owght untell yt ye ende off ye staff
doth fall Iustly wth yn ye midded off ye dyche of water
and then mesure from yt place unto ye foott off ye wall
off the tower and howe many foott yt it is so
it is Iust the heyth off ye tower wthowght any fayle

The iii devise *hipsometrie*

* And further more yff yt it be so yt you can nott mesure
unto ye wall off the tower then to knowe ye heyth off
a tower walle or steaple then you moost do thus wth
your dyche off watter ye first standinge beynge taken
as before is rehersed yt ye shaddow off ye topp is Iust
wth ye lenght off ye staff then make a marke uppon
Iust halff ye lenght off ye staffe and then wher as ye
dyche off watter stoode first ther make a marke and
then remove ye dyshe off water farder from ye tower
or steapell and then goo so farr backwardes untell
yt you doth see ye shaddow off ye topp therof in

ye dyshe off watter and to agre wth ye marke vpon the
myddell off ye staff by the syght off youre eye and then
hange downe ye staff as beffore ys wher feldt ye
end off the staff doth reche justly ye myddell off ye dyche
off watter as beffore ys rehersed yff ye hole length off
ye staff be to short then sett ye dyshe off watter nerer
vnto ye tower and yff it doth over reche then sett it
further off and so removynge it in and owght vntell
yt doth agre agayne and then mesurynge the
grownde betwene those too standynges and yt will shew
vnto you ye trew heyth off ye tower or steppell &c.

The 112 devise statticke

ffor yt I do thinke ~~yt~~ it very necessary and convenient
for to shew vnto you how for to know what wayght
yt you ar able for to rayse or lyfft vppe from ye grownd
yff yt it ware after the order off tollpress wyth ye sole
lay to poosh ye one hand vnder it and to way or press down
ye other hand for yt yt is vsed many tymes abowght ye
lyftynge off great and heavy thinges as ye lyftyng
off great and heavy ordynance or great and heavy
tymber or stones &c and it is this knowen howe
much or what wayght yt it will lyft or rayse
vppe ~~I wott~~ how much ~~muche yt it will lyft or~~
off ye tollpress is more ~~is more~~ over ye wayght lengh

the thinge vnderneth more ye one way then it is the
other way so accordyngly vnto yt proportion the
thinge wilbe lyffted as ye thinge of 100 wayght
the which is ffther afterward way vp a 1000 wayght
there 5000 as you do place ye thinge for ye purpose as for
an Insample this the thinge yt I haue for to lyfft vp is
a 1000 wayght and ye peace of tymber yt I doe make
my wayinge tre is 11 foott long and better wch fforce
I do place ye blocke or thinge vnderneth at one foott
from ye thinge yt is to be lyffted and so I do lay ye
wayinge tre yt it is 10 ffoott over ye end way and
but one foott ye other way and lyeing in yt frome a
100 wayght will way vp ye 1000 wayght and by
this order you ~~make~~ may make your provision in yt sort yt
you may lyfft any thinge at ease &c

The 113 devise trochilike

And ffurthermore in ~~the~~ lyke maner you may knowe
what wayght wilbe lyffted wth a whele as this
foote how much in deameter or in circumference ye
ye whele doth exceede the axeltre yt ye rope goeth a
bowght so much in proportion shall ye whele lyffte
ye lesse wayght to rayse or lyfft ye bigger as for An
Insample a whele of 12 foott in deamiter and hath

cantchellture yt ye rope goeth abowght off one foott in
deamitor / then a parson yt wayeth lyttell more then
twoo wayght together in ye whell shall way a thing off
12 hundreth wayght &c accordyng unto ye compast off
ye whell and ye compas off ye cheltre yt ye lesser wayght
will way upp the bygger and ye lyke effectes as in ye
offten folldyngs off ropes for to rowne in pullys as
we may see by ye tabbelle off shyves &c

The 114 deme trochilicke

And allso in whelles yf yt one whell doth torne an
other you may know by ye one whell how often tymes
yt ye other whell shall trone yt abowght whether yt the
whelles doth torne or goe by teth or as som doth torne them
by hoppes or by a rope or lyne &c as this yf yt ye on whell
doth torne ye other by teth then yt is knowen by the
nomber of teth tacking in ye other whell as yf ye nom-
ber of ye teth off ye on whell be dobell unto ye other then
for ye one whell in ye torning abowght one tyme the
other shallbe torned tow tymes &c and yf yt it be so
yt ye nomber of teth be 10 tymes ye lesser then at ye torning
off ye bygger whell one tyme ye lesser shallbe torned 10 tymes
abowghtes &c and in like manner yf ye nomber of teth
ware 100 tymes ye nomber off ye lesser then for ye one
torning abowght off ye one ye other shallbe torned a 100
tymes &c allwayes accordyng unto ye nomber off ye one

by ye nomber of ye other proportion forme proportion a
cordyngly unto ye nomber of ye tethe in bothe ye wheles &c

The 115 dowe Trochilicke

And allso in lyke manner you may knowe how manye
tymes ye one whele will tourne ye other whele a bowghte
when yt ye one whele dothe tourne ye other whele by a rope
or lyne or by a chayne or suche other lyke as this by the
circomferens of bothe ye wheles for yf ye one whele be
dobell ye circomferens or compase of ye other then for ye
tourninge of ye byger whele one abowghte ye lesser shall
tourne twyse abowghtes and furdermor yf ye beger be 10
ye compace of ye lesse then yt shall turne 10 tymes
tymes abowght &c acordyngly unto ye circomferens or
compase of bothe ye wheles proportion unto proportion

The 116 dowe Embadometrie

And furdermor for to knowe ye contents of any superffitiall
or platforme whether yt it be rounde or squar triangelle
or any other forme or shape what so ever yt it be and
for to dobell ye contents more or less what so ever yt it
be to have it lesser or byger and to kepe yt forme and
proportion it is this to be done yf yt yt be a whele
or a squar rowll then it asketh but on work for all
but yf it have dyvers sydes and of sondry lenghtes
then it must be as many workes as ther is severall
sydes and for to kepe yt forme and proportion in all
poyntes and to be of an other bygnes mor or lesse then

do thes first mollyplye the sides in it selfe nomber and
the beinge done and then encrease or decrease the nomber
acordinglye unto the bygnes or smallnes as you wolde
have the platforme or superficiall and that done then
extract the square roote of that nomber and that will shew
unto you how longe or short that the sides of the superficiall
shalbe &c and this done by everye side you shall
have the forme, and proportion and be of what bygnes
that you list &c as I do more further shewe in the
third part of my booke called a tresure unto travelers

The 117 Stereometrie

And further more yf that you have any cabell or square
and you knowinge the content of the one and wold know
the content of the other as yf it were a cabell or rope
or a mast or any other thinge and you knowinge
that the one at such a length doth contayne so many fu
thes or so many pounde wayght and you havinge
another of another syde bygger or lesser and at that length
you wold know what that shold contayne other in
wayght or in measure then do thes first mollyplye
them both severally in ther circomference or ells in
ther diameter for it is all on matter soe that is to
say both the nombers to be as one and then the beinge
done mollyplye the unknowen by the content of the poundes
or ynches of the knowen and that beinge done then

devid ye hole nomber by ye nomber yt was moltyplyed
of ye knowne contente and yt will shew unto you ye
new contente in poundes or inches of ye unknowne
that I do more playnly shew in ye third part of my
booke before expressed &c

The 118 devise Stereometrie

And furdermore for to know how for too dobell ye contente
of any solid body yt is to say to make it bygger or lesser
and for to kepe yt in ye proportion as yf it ware
a cube or a bowll or a globe or any other massy bodye
as castle or a shipe or bott and to kepe yt mollde and
proportion and to be bygger or lesser at your dyscretione
that you must doe by this meanes as this you havinge
any thinge for and instample and wold have an other
of yt shape and forme in all poyntes but yt you woold
have it so much bygger or lesser then you must doe
this take ye measure of it and yt done then moltyplye
it cubycally and yt done increase ye nomber unto that
quantitie in bygnes or elles yf yt you woold have ytt
lesse then to rebate ye nomber unto ye quantitie yt you
wold have ye thinge in bygnes and yt beinge done then
extract ye cubicke roott thereof and yt will shew unto
you how longe and brode or depe yt ye thinge must be
and by this order you may dobell a cask in bygnesse
more or lesse or ye burden or tunnadge of a shipe and to

shape ye molde and proportione mathe poyntes as I doe
more at large declare in my booke called the tresure
for travelers &c

The 119 devise Stereometrie

And furder more yf yt you have ether cubes or globes
ether off wood stone or mettall and you knowyng ye
contents off ye one and whether yt it be in wayght or measure
and you do desire to know ye contents off ye other then you
must do this first you must molltiply them bothe
severally cubykly yt is to say yf yt it war a globe
or a shott for a rounde beynge off iron to molltiply ye
hight off it in ye selfe nomber and then yt nomber to
be molltiplyed agayne by ye hight and then it is cubykly
and yt done you knowyng ye wayght off ye one and
desire to know ye wayght off ye other then molltyple
ye unknowen shott by ye wayght off ye knowen and then
that nomber to be devided by ye nomber off ye knowen
and yt shall shew unto you ye wayght off ye unknowen
and by this order you may know ye wayght off any
shotes off iron you knowynge ye wayght off one you
may know ye wayght off all other shotes off yt kinde
off mettayle &c as I do furder declare in ye therd part off my booke
before wretten &c

The 120 devise Stereometrie

And furdermore yf yt you wold know how many
foott or inches yt there is in any globe that is there

knowen ye circomferens and ye deameter beyinge
knowen then mollyplye ye halfe circomferens wt
ye halfe deameter and yt done then mollyply that
nomber agayne by ye hole deameter and then take
2/3 partes of yt nomber and yt will shew unto you
how many foott or Inches ys in yt globe or elles
do this mollyply ye nomber deameter of ye globe
cubycolly and yt done mollyply yt nomber by 11
and yt done devide yt hole nomber by 21 and yt in
such maner will shew unto you ye contente of ye
globe or elles a cube of 4 will make a globe of 5 &c
as I do mor at large shew unto you in ye third
part of my booke called a treasure for travylers &c

The 121 devise Stereometrie

* As touchinge ye measuringe of any strange forme as
such yt geometri can nott geve nor ordynge for
ye measuringe therof as a pyller yt is Inbowed in
one place and bulleth owt in an other place or a
branch in metayll or a crowne or a cuppe bowll &c
such other lyke for to know ye contente in metayll
how many Inches yt there was of it that you may
know by this meanes to putt watter in a vessell or
tube and yt done to marke ye edge of ye water rownde

bowghtes and yt done then putt in that thing yt you
be mynde to knowe ye contente in to ye watter yt it
may be covered and then take owght all ye water yt
is rayssed by ye meanes off ye thinge put into ye water
untell yt ye water doth stand just wt ye place yt you
marked before and then you havinge a tube or any
thinge to put yt watter in to yt you may measure ye nomber
off inches in it then ye water yt you have taken owght
will shew unto you justly how many inches off
metayll yt there is in ye thing yt you have proved by
ye water and by this meanes you may knowe ye contente
off any thing what forme soever yt it hath &c as I
do furder shew in ye 5 chapter off ye 4 part off my
booke called a tresure for travellers &c

The 122 devise perspective

And further more it is possyble for to place a glase in
a chamber or a parlore in a howse for to se any thinge
abrode in ye fealdes or yff yt it be nere unto any haven
or ryver wher as shipps or bottes doth passe to & from
yt they may see in ye glase wt in the howse ye thinges
yt are abrode as plainly as iff yt they should goe abrode
and gett them up unto som hie hill or hie tower
for to see them off whereoff ye wiche thing is verry
necessary ether for men off honore or gentellmen for

to be sene in the chamber what is abrode in some
suche partes of the grownd as they haue any pleasure for
to be holde and so in to it what is stirring there for
the quantytie that it will shewe as there doe in the parke
or cattell in the pastures or what persons that there
is stirringe in the gardens or orchardes and allso
it is very necessary for a capitayne or the generall
of a towne or forte or castell whether that it be in
suche places that is wth the towne in the londe or that the haue
any charge to looke towardes the sea or haven or ryver
it is very necessary for them for the glasses may be
so placed that they may see yf that ther be any shippes
comminge or goinge in the sea or haven or ryver or
any persons in the hyghe waye but the greatest Im
pediment that the glasses hath is that you shall not see
no great extent of grownd in compasse except that the
glasse be very large and allso the wyndow that the
lyght cometh In at be large in lyke manner
and for the placinge of a glasse in a chamber or parlo
to see the thinges abrode yt must be thus don fyrst you
moost prepare dyvers glasses of a greatt proportion
that are very parffett and good lokinge glasses either
of steele or of cristall and the done the place must

be reysed wher yt yt must stond for yt is nott possyble
to place a glase nott in some chambers to se any thing
abrode but it must be in such a chamber as ys
convenyente for the purpose that hath a very hyghe roffe
and that hath wyndowes that are of a great hyth from
the flowre or elles some hyght towere neare unto yt
and yff that the place be convenyent for that purpose then
thes you must doe fyrst the place must be assygned
that you would se in the place. and then whether that the
place be fare of or neare then you must place the
fyrst glase a lofftte against a wyndow that is opon
unto the place and that done yff that it be very hyghte
then torne the shadowe of the glase accordyngly as
you do se cause for your purposse bryngynge the
shadow downe wardes and against that glase place
an other glase to resceve the (theame of) shadow of the thinges
abrode and that done you may torne the shadow of that
glase downwardes unto whatt place that you lyst
and so place another glase against that at your dys-
cretione and so to place as many glasses untell that
youe have brought it unto the place that you would
brynge it untell and then to sett all the glasses fast
for yff that any of them be stured neuer so lyttell then

ye shadow will be torned owghte of ye glas &c and by this
meanes you may remove ye shadow of any thinge by
glasses mayd of dew proportion from one place unto an
other untell yt you have broughte it unto what place
you do desire at your plesure and so by yt meanes to see in
a howse what thinges is a brode &c/

ye reflection will be very weake

The 123 devis Cosmographie

And furdermore I do thinke it convenient for any per
son for to knowe ye distance how farre yt it is unto any
towne uppon ye face of ye hole earth and yt is thus
knowen ye true longitude and ye trew latitude be
ynge knowen then do this first of ye place yt you are
in you knowynge ye latitude yt is to say how many
degrees yt ye polle of ye world is elevated above the
horizon and then in lyke maner to knowe the
trew longitude yt is to say to knowe how many de
grees yt it is from ye meridian of ye canary Ilandes
and yt knowen yf yt ye place yt you doe respecte have
ye longitude yt your towne hath and hath an other
latitude then seeke how many degrees yt ye two places
doth differ as thus substract ye lesse owght of ye more
both in degrees and mynettes and then ye which doth
remayne shalbe ye degrees of deversyte and yt done
then multeplye ye nomber of degrees by 60 and ffor

euery mynott ouer ade one and that is the trewe dystance
vnto that sayd towne from you &c for in latitude all
wayes 60 myles is a degree saue yf that the towne haue
that latitude that your towne hath but it hath another
longitude then in lyke manner sobtract the lesse longi
tude from the byger longitude both in degrees & mynutes
and the beinge knowen then seeke how many myles
will make a degree in that parallell and that you shall
knowe in the 16 chapter of my booke called the
regement for the sea by the demonstration of parralles
a table made for that purpose and then the beinge
knowen then multyply the degrees of deversytye by
the nomber of myles to a degree in that parallell and that
will shew vnto you the trewe nomber of myles vnto
that towne &c but yf that the sayd towne doth dyffer both
in degrees of longitude and also in the latitude then
as before ys rehersed sobtract the lesse owght off
the more severally both for the longitude and the latitude
and so the deversytye beinge knowinge both in
longitude and in latytude then for the deversytye of the
latytude multyply the nomber of degrees by 60 for that
60 myles is allwayes a degree in latitude but for
the degrees in longitude you must seeke how many
myles will make a degree in both the parallels

yt ys to say for ye parrellell off your towne and the
parallell off ye other towne and yt done then molltyply
fyrst ye nomber off degrees off deversytye by ye mylles
unto a degree off your towne and then in lyke maner
molltyply ye nomber off degrees by ye mylles unto a degree
off ye other towne and yt don then ade both those towe
nombers unto gether and yt don then take half those
towe nombers added to gether and then molltyply ye
nomber yt you hand ~~taken ye~~ halfe off bothe the
parrellelles added together squarely yt ys to saye in
the sellf nomber and yt done then molltyply ye nomber
off mylles in ye degrees off latitude in lyke maner squarely
and then ade both those nombers to gether yt ys to saye
ye nomber molltyplyed squarely for ye longitude and
allso ye nomber yt ys molltyplyed squarely for ye latytude
and then to extract ye square roott off both those towe
nombers added to gether and ye radicall nomber ys
ye trewe dystance betwene ye towe townes &c as I do
more att large declare in ye fyrst chapter off the
seconde part off my booke called a treasure ffor
travillers

The 124 devise Cosmographie

And for to know unto whatt quarteres off ye worlde yt
one towne doth beare from a nother yt ys to say by what

poynt of ye compas yt it standeth one from you yt is thus
knowen in this maner by ye degres of longitude &
of latitude as thus yf yt yt hath ye longitude yt your
towne hath and in latitude is more degres then
your towne hath then yt place is dew north from you
and yf yt it hath fewer degres in latitude then your
towne hath then it is dew south from you and yf yt
it hath ye just latitude of your towne and have fewer
degres in longitude then your towne hath then yt
place is dew west from you and yf more degres of longitude
then it is dew east from you &c and yf yt it differ both
in longitude and in latitude then to know by what
part of ye compas yt it beareth yt is thus knowen yf
yt it have fewer degres of longitude then your place
and fewer degres in latitude in like maner then
it is according unto ye nomber of degres &c if so shalbe
according unto ye nomber of myles as thus yf ye place
be that in ye longitude and ye latitude both in like nom
ber or quantitie then ye place is sothwest from you
and yf ye place be lesse in latitude and more in
longitude then your place is and ye nomber of myles
from your place equall both in longitude and latitude
then ye place is sotheast from your place and yf
yt ye other towne or place hath more degres or myles
both in longitude and in latitude & the nomber equall

then ye towne or plac is northeast from you and yff
yt ye plac hath fewer degres off longitude and more
degres off latitude and espessally ye degres and nomber
off mylles equalle then yt ye towne or plac is north west
from your towne or plac &c accordynge unto ye proportion
yt it beareth accordyng unto ye degres or off ye nomber off
mylles yt ye one plac is from ye other and so shall it beare
from you accordyngelye by ye poyntes off ye compase as
I do mor at large declare in ye second chapter off the
second parte off my booke called a tresure unto travelers

The 125 Astronomie

* And furthermor as teacheynge this howe for to knowe
howe for to tacke ye latitude or ye alltytude off the
polle abowe ye horyzon I do shew how for to doe
yt in ye 6 and 7 chapter off my booke called the
regement for ye sea and ther is shewed how for to
doo it wth instrumentes and for yt every parsone
hath nott instrumentes at all tymes abowght
them I do thinck it very nessesary for to be knowen
how for to knowe ye hyghe off ye sonne by ye shadow
off ye sonne wth a staffe for to knowe how many
degres yt ye sonne is in hyghe abowe the horyzon
as this tacke a staff off 5 foott longe and devide
that in to 60 equall partes and then every parte wyll

of an Inch and then ye sonne shyninge upon a playne
and levell grounde then sett ye staff upright then
measure the lengtht of ye shadow of the staffe
and that shall shewe unto you howe many
degrees yt the sonne is above the horizon
and for that here doth followe a table
for that purposse ye first nomber is the
degres in ~~the~~ heyght ye seconde nomber
is the lengtht of the staffe the thyrd
nomber is the holl partes or Inches
and the last is the partes of an Inch

degres in heyght	length off ye staff	Inches	partes	degres in heyght	length off ye staff	Inches	partes	degres in heyght	length off ye staff	Inches	partes
1	59	47	2/5	11	5	8	2/3	21	2	36	3/10
2	29	38	1/6	12	4	42	4/15	22	2	28	1/2
3	19	4	11/15	13	4	19	53/60	23	2	21	7/20
4	14	18	1/15	14	4	0	19/30	24	2	14	3/4
5	11	25	4/5	15	3	43	11/12	25	2	8	13/20
6	9	30	17/20	16	3	29	7/30	26	2	3	0
7	8	8	13/20	17	3	16	1/4	27	1	57	3/4
8	7	6	11/12	18	3	4	13/20	28	1	52	5/6
9	6	18	49/60	19	2	54	1/4	29	1	48	7/30
10	5	40	4/15	20	2	44	5/6	30	1	43	9/10

31	1	39	17/20
32	1	36	1/60
33	1	32	23/60
34	1	28	12/20
35	1	26	41/60
36	1	22	17/30
37	1	19	37/60
38	1	16	4/15
39	1	14	1/12
40	1	11	1/2
41	1	9	1/60
42	1	6	12/30
43	1	4	1/3
44	1	2	2/15
45	1	0	0
46	0	57	14/15
47	0	55	12/20
48	0	54	1/60
49	0	52	3/20

51	48	7/12
52	46	13/15
53	45	1/5
54	43	7/12
55	42	1/60
56	40	7/15
57	38	12/20
58	37	29/60
59	36	1/20
60	34	12/30
61	33	1/4
62	31	2/10
63	30	17/30
64	29	1/4
65	27	22/30
66	26	43/60
67	25	7/15
68	24	7/30
69	23	1/30

71	20	13/20
72	19	32/60
73	18	1/3
74	17	1/5
75	16	1/15
76	14	12/20
77	13	17/20
78	12	3/4
79	11	13/20
80	10	17/30
81	9	1/2
82	8	13/30
83	7	11/30
84	6	3/10
85	5	1/4
86	4	11/60
87	3	2/15
88	2	1/12
89	1	1/20
90	0	

The 126 dere astronomie

And allso by the length of the shadowe
of the sonne with a staff you may knowe
the trew howre of the day that is to saye
what that it is a clock as it is comonly
termed and for to doe that you shall do thus
take any staff or stick of what length
that you list and devide that in to
12 ~~pa~~ equalle partes as yf it ware a
foott rull then every part sholde be an
Inche and then acordinge unto everye
month in the yeare here doth followe
a table of the length of the shadow at none
and the staff or rull of a foott longe the
firste nomber in the square is the nomber
of foott or the staff or rull the seconde nomber
of Inches or the holl divisyones and the
thirde is the partes or devisyones of Inches
that will nott be a holl Inche & the nombers

m the browne square vp the longest of the shadow
of the staff at the short and one of the short
and ab before vp the first nombre
vp the nomber of the longest of the staffe and
the browne nomber of the longe and the third
the odd partes that will not be an square and
third square vp the longest of the shadow at
10 of the short and 2 of the short and ab before
vp shall the nombre as and m the forthe square
that vp the longest of the shadow at 9 of the short
and 3 of the short ab before yt is required and m
the square vp the longest of the shadow of the
staffe at 8 of the short and 4 of the short and
now m that square the vp but to nombre and the
first vp the nomber of the longest of the staffe
and the other the integer or denominate &c and
m the square vp the longest of the shadow of
the staffe at 7 of the short m the morning &
5 of the short m the after noone & m the square
vp the longest of the shadow of the staff at 6

of the clocke in the mornynge and 6 of the clocke
in the after none &c and in the 8 squar is the lengest
of the shadow of the rule or staffe at 5 of the
clocke in the mornynge and 7 of the clocke in
the after none &c and in the 9 squard is the lengest
of the shadow of the rule or staff at 4 of the
clocke in the mornynge and 8 of the clocke in
the after none &c and now foloweth the table

Iune 169 ye last day	0.6.2/3	0.7.5/6	0.9.1/3	1.0.1/3	1.5	2.0	3.3	7.1
Iuly 169 ye 13 day	0.7.1/2	0.8.0	0.10.0	1.0.3/4	1.6	2.1	3.6	8.4
Iuly 169 ye last day	0.9.1/4	0.9.2/3	0.11.1/2	1.4.1/4	1.8	2.7	4.10	21.8
august ye 14 day	0.10.0	0.10.4/5	1.0.7/8	1.5.0	1.11	2.11	6.3	
august ye last day	1.0.5/6	1.1.4/5	1.4.1/3	1.9.0	2.7	4.7	16.0	
September ye 14 day	1.3.0	1.4.0	1.7.0	2.0.2/3	3.0	6.0		
September ye last day	1.8.1/4	1.9.3/4	2.1.3/4	2.9.1/2	4.8	19.0		
october ye 13 day	1.11.1/2	2.1.1/4	2.8.1/4	3.5.3/4	6.8			
october ye last day	2.7.1/2	2.9.1/2	3.6.0	4.6.0	17.0			
november ye 12 day	3.0.0	3.3.1/4	4.2.0	6.10.0	50.0			
november ye last day	3.7.0	4.0.0	5.2.0	10.10.0				
Desember ye 12 day	3.8.3/4	4.1.3/4	5.5.0	13.4.0				

	XII none	At XI ſt one	At X ſt ii	At IX ſt iii					
	F I	p ſt F I	p ſt F I	p ſt F I	p	At VIII ſt iiii			
January 1st 1st Day	3 · 4 · ½	3 · 9 · ⅔	4 · 8 · ¼	8 8 0	F I				
January 1st 10 Day	2 · 10 · 0	3 · 3 · ¼	4 · 2 · ¾	7 · 1 · ½	29 · 0				
January 2d last Day	2 · 3 · 0	2 · 9 · 0	3 · 0 · 0	4 · 3 · ½	10 · 10	At VII ſt V			
February 1st 10 Day	1 · 11 · ½	2 · 1 · ¼	2 · 8 · ¼	3 · 5 · ¾	6 · 8	F I			
February 2d last Day	1 · 5 · ½	1 · 6 · ½	1 · 10 · 0	3 · 0 · 0	4 · 0	9 · 0	At VI ſt VI		
March 1st Day	1 · 3 · 0	1 · 4 · 0	1 · 7 · 0	2 · 0 · ⅔	3 · 0	6 · 0	F I		
March 2d last Day	1 · 0 · 0	1 · 0 · ⅖	1 · 2 · ¼	1 · 6 · ½	2 · 3	3 · 8	9 · 6	At V worwuſt ſt VII after wore	
April 1st Day	0 · 10 · 0	0 · 10 · ⅘	1 · 0 · ⅞	1 · 5 · 0	1 · 11	2 · 11	6 · 3	F I	
April 2d last Day	0 · 8 · 1/10	0 · 8 · ½	0 · 10 · ½	1 · 1 · ¾	1 · 7	2 · 4	4 · 0	11 · 5	At viii worwu ſt viii after w
May 1st Day	0 · 7 · ½	0 · 8 · 0	0 · 10 · 0	1 · 0 · ¾	1 · 5	2 · 1	3 · 6	8 · 4	F I
May 2d last Day	0 · 6 · ½	0 · 7 · ¼	0 · 9 · 1/20	1 · 0 · 0	1 · 4	1 · 11	3 · 0	6 · 3	50 · 0
June 1st Day	0 · 6 · ⅓	0 · 7 · 0	0 · 8 · ¾	0 · 11 · ¾	1 · 3	1 · 10	2 · 11	5 · 10	42 · 0
June 2d	0 · 6 · ⅜	0 · 7 · ⅝	0 · 9 · ½	1 · 0 · ½	1 · 5	2 · 0	3 · 3	7 · 1	

The 127 dore

And ffurthermore you beynge in a towne that
you do knowe that you shalbe besieged you
maste provyde from before hand that you
may send letters and receve letters of your
frendes from tyme to tyme wher by that you
may declare your estate to your frendes and
allso to knowe your frendes mynde &c. abowte this
yf that ther is any pigeon or dove howse in ye
towne lett them be well cherysshed before hand
and then carry a certayne nomber of those pigeons
unto your frendes and then in lyke maner take
a certayne nombers of pygeons from your frende
and then lett them be kept close in a howse
yt they cann nott gett away and then when
that you ar beseyged yt you cann nott send unto
your frendes nor your frendes unto you then
when you lyst to send any letters then take
one of those pigeons and make the letter fast
abowght hir necke by some provysion that it
do nott troble hir wynges and she will repayre
unto the dovehowse yt she was cherysshed at & hath
byn longe usynge unto & then ye dovehowse beyng serched

every weyght you shall com by the letters &c

The 128 devic Staticke

for to cause Iron leade stone or any kynde of metall *
what heavy yt it be to swyme in ye watter wth
out ye ayd of any thinge ther support it or beare
it this is to be done to make it hollow or concave
lyke a bowlle or bott or a troff or what shape se
ever that it haue untell yt ye sydes may be raysed
so hye yt ye water can nott com over ye tope off or
ye syde untell yt ther is ye magnitude or quantitye
of ye ratt for every foott square to be in weyght
under 50 pounde and ye more yt it is lyter the
better it will swyme agaynst any fayle &c

The 129 devic perspective

As it is nott unknowen in respect unto all *
parsones yt you may burne any thing yt is apt
to burne wth a glas at hand which is done by
the sonne beames pearsynge thorow ye glas
for yt ye sonne beames be unyted and knyte
all togyther in the center therof which is
the very cause yt it burneth and as we doe
rede yt archimedes burned the romayne navy

at Syracusa in the Ilonde of Sycilye some have
supposed yt he did burne them wth such kynde of
glasses wherof is most unpossyble wherfore
it most needes be that they ware burned wth dyvers
glasses and ye reflection of the sonne beames
turned unto them but this is to be noted yt
it is possyble that fewer glasses may serve
to burne any thinge there in ye latytude then
that it ~~we~~ noo[illegible] doo heare in this latitude for that
the sonne beames ys more hotter for ye latitude
of Syracusa is but 35 degrees and a halffe
and to burne any thinge any great dystance
of wth glasses it requireth to have some
skyll in geametrie or elles it is nott possy-
ble for to do it and for to burne any thinge
yt is apte to burne it must be this handeled
they must prepare an nomber of glasses off
steel made of purpose and well pollyshed &
to place these glasses to burne they must doe
this the place beinge assigned to burne as

yff yt it ware upon powder flax or tow or pich
or tar or such like thinges yt will take fire
quickly the sonne shyninge very bryght
then sett ye glas agaynst the sonne and then
torne the reflection beame or shaddowe
unto the place assigned and then place an
other glas in the lyke maner and torne the
reflection beame or shadow unto yt place in
like maner ryght upon ye first beame of the
beame or shadow and so to place more glasses and
to be shewer yt all ye reflection beame or sha
dowes doth rest upon one place and so by a great
nomber of glasses to multyply ye heat in the
beame it will be sett one fyere and burne
but you must be shewer yt all the reflected
beames or shadowes doth rest in one place or elles
it will be unto no purposse and at a great distance
you shall have much to doe to discerne or see
yt &c wherfore you must have the ayde of
geometrie to use it accordinge unto the distance
and to place ye glasses in a frame which I doe

omytt at this tyme for brevytie &c

The 130 devic perspective

* ffor to see any smayll thing a greatt distance
off from you it requireth the ayd off towe
glasses and one glasse must be mad off purposs
and it may be mayd in such sort y^t you may
see a small thinge a grett distance off as this
to reade a letter y^t is sett open neare a quarter
off a myll from you and allso to see a mane
4 or 5 mylles from you or to vewe a towne or
castell and to see any wyndow or such lyck
thinges 6 or 7 mylles from you and to declare
what man off glasses that this must be the
one glasse y^t must be made off purposse is
ffirst the small borninge glasse off y^t kynde
off glasse and must be rounde and sett in a
frame as those be but that it must be made
very large off a ffoott or 14 or 16 inches brode
And the ~~[illegible]~~ broder the better &c y^t propertye

of this glas is this yf that you do beholde Any
thinge therwith the glas then your eye beinge
neare unto it then it shewethe it selfe accordinge
unto the thinge but as you doe goe backwarde
the thinge sheweth bygger and bygger untell
that the thinge shall seme of a monsterous
bignes but yf that you do goe to far back then
it will declare and be small and torne the
fasshion downe wardes but now to use this
glas to see a small thinge a great dystance
then do this the thinge or place that you wolde
vewe and descerne sett that glasse fast and the
myddell of the glas to stonde ryght with the place
assigned and besuer that it dothe nott stond oblicke
or awry by no meanes and that done then take
a verry fayre large lokynge glas that is welle
polysshed and sett that glas derectely ryght
with the polysshed syde agaynst the first glas
to the entent to receyve the beam or shadow that
cometh there the first placed glas and sett

it at ~~lengthe~~ suche a dystance off that the thinge
shall make the beame or shadowe so large that it
may serve your turne and so by the meanes you
shall see in the lookinge glas a small thinge
a great dystance for yf that the first perspective
glas be well made and very large you
may discerne and knowe the face or ~~visshion~~ visnomye
off a man a myle off from you wherfore
in myne opinyon this is very nessessary in
dyvers respectes as the vewinge off any armye
off men and suche other lyke causes which I
do omytt &c

The 131 devise Trochilicke

* for to make a crane or Ingyne or gynne to way
any great wayght you may knowe before hand
what that it will way as in the 109 devise and
allso you may multyplye the thinge in such
sort that you may make a 100 wayght to way
or lyfte up 20000 nay 100000 wayght yf that
you will as this the crane or Ingyne shall

hath a whele of 12 foott in diamiter and the axeltre
is a foott in diamiter now one parson gyvinge
in the whele of any thinge not mor then 100 wayght
a will way 1200 wayght and then you may finde
ane other whele of that diamiter and the axeltre allso
and a rope to goe abought the tirtom from of the
first wheele unto the axeltre of the next wheele
then the parson to goe ~~[illegible]~~ in the wheile will
way or lyfft 14400 and further more yff the
you should ade a thirde whele in lyke manner
of the diamiter in all pointes then the parson gyvinge
in the wheele shold way or lyffte or 172800 li
that contayne 86 tonnes and a halff but then it
will ryse butt very slowlye and the thinge that
doth beare or support it underneth had nede
be very stronge to beare such a hudge wayght
and allso the first wheeles and by this order
you may multiplye the thinge to lyffte wayghtes
infinitlye &c [illegible] 132 downe
And further more you may make ingynes

to thrust from you or to pull unto you or to lyft upp
or to presse downe wth greatt force ether to you wth
wheelles as beffore is declared or elles to you wth
Skrewes or to you ~~w~~ wythe bothe as to throwe open hege
and stronge gates or elles you ~~takynge~~ good holde
to pull them open unto you wardes and will make
but lyttell noyse in ye doynge therof but you must
be shewre to sett ye Ingyen fast yf to thrust from
to be strongly and well backed and to pull to them
it must be strongly bollstered beffore sufficient
to be able to staye ye torne &c

The 133 Thaumaturgike

As touchinge the makynge of any strange workes
yt the world hath merveyled as these brasen
hede yt did seme for to speake and ye sarpent of
brasse for to hysse or a dove of wood for to fly or
an Eagell made by arte of wood and other mett
alle to flye and byrdes made of brass or tynne
or other mettall to synge prettelye and suche
~~other lyke~~ other lyke devises som hav thought
yt it hath byne done by Inchantment which

as no suche thinge but yt it hath byne done by
wheeles as you may see by clockes yt dothe
kepe tyme some hanginge wth plomettes and other
som wth springes as these ~~as~~ smalle clockes yt
be vsed in tablites to hange abowght ther neckes
&c as ye brasen hed yt did som saie to
speake myght be made by suche wheell worke to
the other wth plomettes or by springes and it
myght have tyme geven vnto it yt at so many
howres and then ye wheeles and other Instrumentes
shold be sett to worke and ye voice yt they did heare
may goe wth bellowes in som tronke or tronckes
of brass or other mettall wth stoppes to alter
ye sounde and may be made to seme to speake som
wordes accordinge vnto ye fansy of ye Inventor so
yt ye simple people will marvell at it and for
to make a birde or fowell made of woode and
mettall wth other thinges made ~~b~~ by arte to flye
it is this to be done wth wheeles to goe wth springes
and so to beat ye ayer wth ye wynges as other birdes
or fowles doe beinge of a resonable lyghtnes be

it may fly and allso to make byrdes of mettall
to synge very swettely and good musyck yt may
be don wth wheelles to yo at any howre or tyme
apoynted by plommettes and then to haue pypes
of tyne or other fyne mettalle to goe wth bellowes
and the pypes to haue stoppes and to goe wth a
barrell to synge what nott at ye Inventer shall
thinke good when he doth make it &c and
allso there may be dyvers hellpes to make
it to seme plesant unto ye eares of ye herers
by lettinge ye sounde or wynde of ye pypes
to passe throwe or in to water for yt will make
a qwaveringe as byrdes doe &c and allso yo may
make a smaull poppett other lyke a man or
woman to seme to goe by wheelles and sprynges
and shall turne and goe serteynly acordinge
unto ye settinge of ye wheelles and sprynges
and allso ye birdes made to fly by art to flye
serteynly as it shall pleas the Inventer by
ye placinge of ye wheelles and sprynges & such
other lyke Inventiones which the common

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